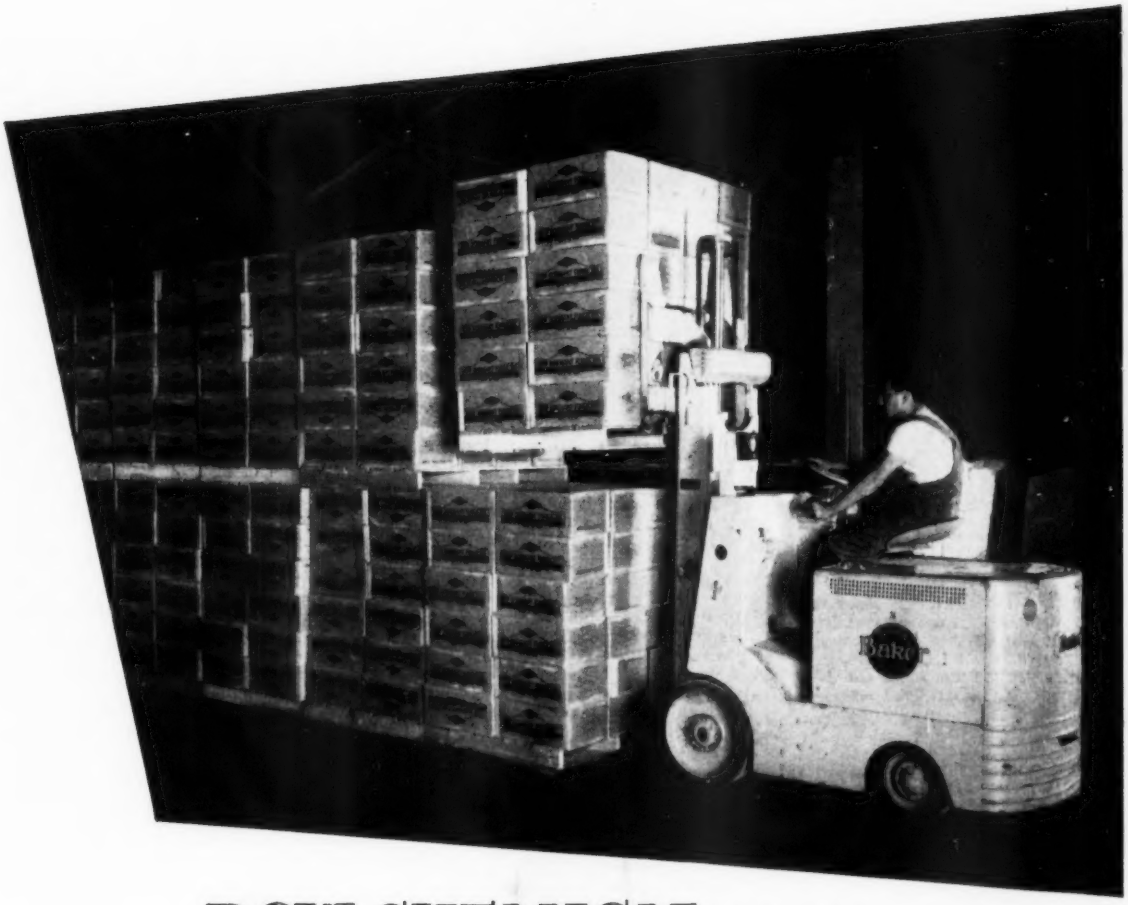

DOW CHEMICAL saves *thousands of dollars annually* with BAKER TRUCKS

■ At the Pittsburg, California, plant of The Dow Chemical Company, five Baker Fork Trucks expedite handling of material in production, storage and shipping departments.

Two of these trucks transport 16″ cylinders of ammonia—twelve at a time—from production to warehouse and from warehouse to shipment, and load them directly into boxcars or highway carriers.

The remaining trucks speed handling of chemical products in bags or cartons on pallets—taking them from production to storage, where they are high-tiered to conserve floor space, and from storage to shipment, where further man-hour savings are made in loading.

Material was formerly transported manually and hand-stacked. Cylinders were rolled by hand, one at a time. The use of Baker Trucks has resulted in savings of thousands of dollars annually.

Write for *your copy of the "Baker Handling Library" a new portfolio of actual case histories.*

Baker
industrial trucks

THE BAKER-RAULANG COMPANY
1251 WEST 80th STREET · CLEVELAND 2, OHIO

The Baker-Lull Corporation • Subsidiary, Minneapolis, Minn.
Material Handling and Construction Equipment

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineer Retires

B. L. Bailie, plant engineer, Hiram Walker & Sons, Inc., Peoria, Ill., is retiring after 20 years' service with the company.

Born in Scranton, Pa., he came to Peoria in 1933 to supervise construction of part of the Hiram Walker Peoria distillery. He joined the company in 1934, and for the first year served as construction engineer of the company's rectifying and bottling plant in the East.

He returned to Peoria in 1935, and was made maintenance engineer in charge of all maintenance work. The following year he was promoted to plant engineer and assumed the added responsibility of the engineering department.

Mr. Bailie plans a short vacation after retirement. Then he says he will be looking for new "hills" to conquer in the engineering field.

Training Program in Cobalt 60 Radiography

EARLY THIS FALL Technical Operations will offer the first in a series of two-weeks training programs in cobalt 60 radiography in industry. This program will cover health physics, the handling of cobalt 60 and other gamma sources, and the practical and theoretical aspects of industrial radiography.

Approximately half the time will be taken in lectures, demonstrations and question and answer periods, the rest being devoted to actual practice, including experiments in shielding, radiation measurement, and the taking of radiographs.

Applicants should have previous technical training and/or experience in some field related to foundry practice, steel fabrication, mechanical engineering, or radiography. For further details write to Technical Operations, Inc., 6 Schouler Court, Arlington 74, Massachusetts.

Looking to New Fields

MINIATURE ELECTRONIC COMPONENTS and precision production instruments are two fields of production which are to be invaded by the 89-year-old Elgin National Watch Co. At the present time the company is conducting a search program to locate concerns in these specific fields with a view to affiliation, according to J. G. Shennan, president.

The company does not intend to minimize its jeweled watch business, but rather, through diversification, to increase growth of the company. Because electronics and instrumentation require precision workmanship, it was felt that these fields were the logical choice for expansion.

Elgin has prepared an "enterprises wanted" brochure which tells in detail the objectives of its program and the type of operations in which it is interested. It will be distributed to business brokers, banks, financial underwriters and in answer to inquiring concerns.

For the Statistically-Minded

BACK IN APRIL '51 we had a correspondent who was trying to determine the normal percentage of plant engineering or maintenance employees to the total work force of the plant.

Now, another reader, Mr. Paul Brisette, plant engineer of Sorel Industries Ltd., in Quebec, Canada, is seeking similar data.

Information gathered by PLANT ENGINEERING following the first request was never published and is not now available. Since pertinent references in the literature seem to be few and far between, perhaps our statistically-minded readers could offer Mr. Brisette some assistance.

As a starter, we pass along the information from him that his plant went into production two and one half years ago, but has since been reorganized. It fabricates steel parts from scrap to finished products—heavy armament—and all processing departments are in operation. These include foundry, conditioning, forge, rough machining, heat treating, machine shop, plate shop and tool room. You may take it from there!

New Plants Going Up

Detroit Steel Products Co. is nearing completion of its new plant in West Elizabeth, a suburb of Pittsburgh, for the production of roof deck, wall and floor panels . . . **Calco Chemical Division** of American Cyanamid Co. will build a titanium dioxide plant on the outskirts of Savannah, Georgia . . . Construction has started on **B. F. Goodrich Chemical Company's** new chemical plant at Calvert City, Kentucky . . . **Worthington Corp.** plans to construct a new plant in Decatur, Alabama, for the manufacture of air conditioning equipment . . . **Micro Division** of Minneapolis-Honeywell Regulator Co. will open the doors soon to its new plant in Warren, Illinois . . . The new hot strip mill at the Ashland, Kentucky, plant of **Armco Steel Corp.** was recently placed in service . . . **Triangle Conduit and Cable Co., Inc.** is in the final stages of construction on its new tube mill in New Brunswick, New Jersey . . . **Devilbiss Mfg. Co., Ltd.,** will shift manufacturing operations from Windsor, Ontario, to a new plant in Barrie, Ontario the latter part of this year . . . Ground has been broken by the **Plexolite Corp.** for their new manufacturing plant in El

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

How to Figure the cost of STEAM TRAPS

1. PRICE—you get a lot of trap for your money when you buy an Armstrong: big capacity in small size; the long-lasting mechanism in traps for low and medium pressures is identical in design, workmanship and materials, to that in traps for 900 degrees, 950 lbs. pressure!

2. INSTALLATION—Armstrong gives you a choice of body styles to save installation labor and pipe fittings.

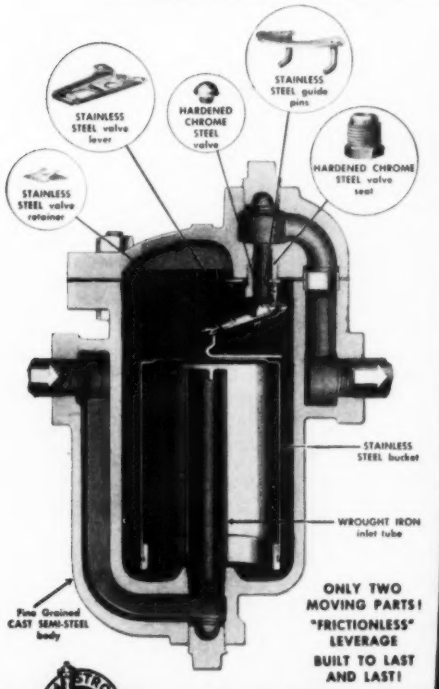
3. MAINTENANCE—Armstrong traps last longer! You save labor, parts cost and downtime. Freedom from leakage saves fuel.

Divide total trap cost by the life of the trap to get *costs per year*—this is where Armstrong traps really shine. Call your Armstrong Representative for the traps you need now, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street • Three Rivers, Michigan

Full Facts In
FREE Catalog J

Catalog J, also an educational handbook on condensate drainage, gives sizes, prices and capacities of Armstrong traps. It tells how to select traps; how to make hook-ups; how to trouble-shoot. Send for a copy today.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HARDENED CHROME STEEL valve
STAINLESS STEEL guide pins
HARDENED CHROME STEEL valve seat
STAINLESS STEEL valve retainer
STAINLESS STEEL bucket
WROUGHT IRON inlet tube
Fine Grained CAST SEMI-STEEL body
ONLY TWO MOVING PARTS!
"FRICTIONLESS" LEVERAGE
BUILT TO LAST AND LAST!

STEAM TRAP CHECK LIST	ARMSTRONG TRAPS
Hardened chrome steel valve and seat?	Yes
All other parts stainless steel?	Yes
Long-lasting "frictionless" leverage?	Yes
Self-cleaning, non-clogging operation?	Yes
Choice of body styles?	Yes
Available with built-in strainers?	Yes
Available with internal check valves?	Yes
40 years inverted bucket trap experience?	Yes
Guaranteed *unconditionally* to satisfy?	Yes

ARMSTRONG STEAM TRAPS COST LESS!

For more facts circle 503 on Reply Card

LIKE AN
ATOM-IC
EXPLOSION

Just 1/32" (pinhole size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 95,000 gallons
of water yearly—costing:
$24.14
@ $1.90 per M cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:
$88.91 if coal (9870 lbs.)
$91.08 if oil (702 gals.)
$84.41 if gas (84,411 cu. ft.)
Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with 'SEXAUER' "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.
"EASY-TITE"
FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems—that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. Send for your copy today!

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

A postcard will bring him and your NEW Catalog promptly.

J. A. SEXAUER MFG. CO., INC. Dept. B-93
2503-05 Third Avenue, New York 51.
as advertised in the SATURDAY EVENING POST

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

For more facts circle 504 on Reply Card

'ROUND ABOUT

Segundo, California . . . A new plant for the manufacture and repair of electrical equipment will be built in Atlanta, Georgia, by the **Westinghouse Electric Corp.** Power transformers, control and switchgear will be the main products handled by the new plant . . . Ground was recently broken for **American Steel and Wire's** new blast furnace for production of merchant pig iron at the Central Furnaces and Dock plant in Cleveland, Ohio . . . **Link-Belt Ltd.**, recently completed its new Scarboro, Ontario, plant for the design and manufacture of conveying and processing equipment . . . Construction is well under way for the Seadrift, Texas, plant of **Carbide and Carbon Chemicals Co.** . . . **Alloy Rods Co.** is constructing a new plant in El Segundo, Los Angeles County, California for the production of alloy arc welding electrodes.

National Electronics Conference

NINTH ANNUAL National Electronics Conference will convene September 28, 29 and 30 at the Hotel Sherman, Chicago.

Technical program of the conference offers 99 papers covering a broad field of electronic research, development and industrial applications and will be supplemented by over 140 exhibits by manufacturers in the electronics field.

Technical sessions will cover such subjects as: circuits, magnetic amplifiers, audio and microphones, servomechanisms, ultrasonics, materials and components, filters, television, electron tubes, nucleonics, computers, and transistors.

Advance registration may be made by writing to National Electronics Conference, Inc., Karl Kramer, Executive Secretary, 852 East 83rd St., Chicago 19.

Plastic Welding Course

PLASTIC Welding Training Courses are offered to industry and will embrace lectures, design theory, welding exercises, design of welding construction, reinforcements, and structural design as influenced by temperature and chemical resistance.

Complete details and information, together with a booklet identifying the various lectures, exercises, and advance course in welding and flame spraying are available by writing to the American Agile Corp., P. O. Box 168, Bedford, O.

Stand-by Plant for Air Compressor Equipment

UNIQUE, NATION-WIDE PLAN to save users of air compressors the high costs and operating losses resulting from sudden failure of their air compressor equipment is offered by Air Compressors and Motors, Inc.

Solving the prevailing problem of how to resume operations without undue delay or big, on-the-spot investments in new air compressor equipment, the firm offers stand-by replacement equipment, promptly installed on a short-term rental basis for the period required

Complete details are available from Air Compressors and Motors, Inc., 13710 Aspinwall Ave., Cleveland, Ohio.

Plant Engineers' Society Tours Waukegan Generating Station

MEMBERS OF THE Plant Engineers' Society of Northern Illinois, being good customers of the Waukegan Station of Public Service, Division of Commonwealth Edison, planned a visit through the generating station for their July meeting.

The plant engineers were most interested in making this tour since their plants consume about 20 per cent of the output of this generating station.

As a power station, it was most interesting to see on one floor 30 years of turbine development, ranging from a 25,000 kw, 350 lb unit in 1922 to a 115,000 kw, 1500 lb unit in 1952.

After the tour, members and guests, numbering 30, adjourned to the Swedish Glee Club for dinner as guests of the Public Service Co.

Plant engineers in the Northern Illinois area interested in becoming a member of this Society, should contact S. A. Simonson, Plant Engineer, Chicago Hardware Foundry Co., North Chicago, Illinois or J. E. Church, Superintendent of Maintenance, Fansteel Metallurgical Corp., North Chicago, Illinois.

Members and guests of the Plant Engineers' Society of Northern Illinois who attended Waukegan Station of Public Service, Division of Commonwealth Edison

FREE..to valve users and buyers

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THE OHIO INJECTOR COMPANY
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Please send me a copy of the new booklet, "OIC Catalog Digest for Quick Valve Selection".

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Company_____

Address_____

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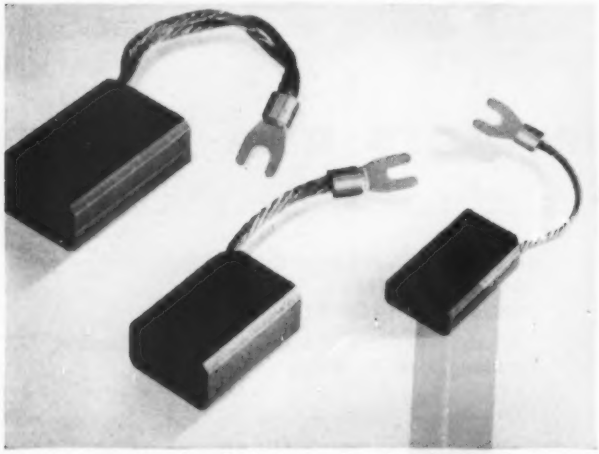
Keep your own stock of Westinghouse Genuine Renewal Parts. At finger-tip reach you can replace worn parts fast... thus reducing costly downtime. Each Westinghouse Renewal Part is clearly numbered, so that no error can be made when ordering the right part. Be prepared . . . keep the right renewal parts in stock . . . parts that are made by Westinghouse, for Westinghouse equipment.



Westinghouse Brushes also help you Beat Trouble To The Draw. These brushes are manufactured for Westinghouse Motors. They wear better and longer. They improve commutation. They reduce sparking. Keep your motors in operation longer by using nothing but Westinghouse Brushes in Westinghouse Motors.

When you buy Genuine Westinghouse Renewal Parts, you get the benefit of constant research improvements. Shown above are two old-style Westinghouse Brushholders and, below them, a later model which has a number of important design improvements. Another great advantage of Westinghouse Renewal Parts.

How to beat trouble to the draw

Having the *right renewal parts* available for replacing worn electrical parts cures a lot of maintenance headaches. Westinghouse Renewal Parts are *made* for Westinghouse equipment, therefore, they *fit* Westinghouse equipment far better than any makeshift or substitute.

Westinghouse Renewal Parts incorporate the most recent research improvements . . . often resulting in even better operation than formerly. Danger from using imitations is removed . . . instead you get exactly the tolerance, proper size and high quality you need for dependable operation of your Westinghouse equipment. You save cost, downtime, repair bills and man power.

This is the kind of backup and reliable parts service that makes your choice of Westinghouse products logical, practical and economical.

You will have no problem ordering the right renewal part for your apparatus. Westinghouse gives you fast delivery from strategically located warehouses throughout the country. Fast delivery from stock in 46 locations enables you to keep low parts inventories at your plant.

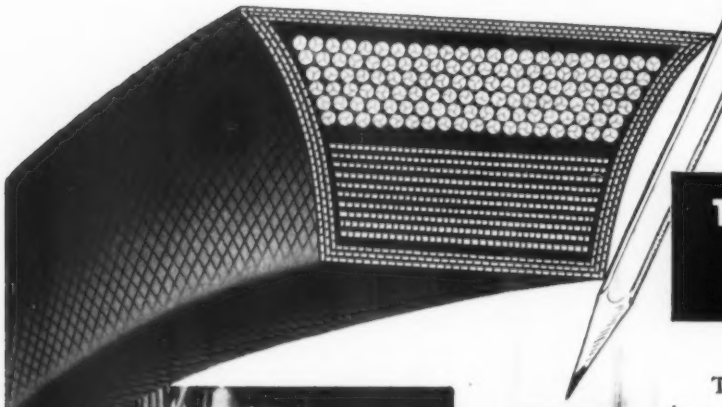
Westinghouse also maintains 36 Repair Plants where all kinds of electrical apparatus is repaired . . . and 46 Field Service Offices to make inspections, adjustments and on-the-spot repairs for equipment that cannot be moved easily.

Don't gamble . . . keep the quality that was originally put into your Westinghouse apparatus by using Genuine Westinghouse Renewal Parts, and the whole scope of Westinghouse Maintenance Service.

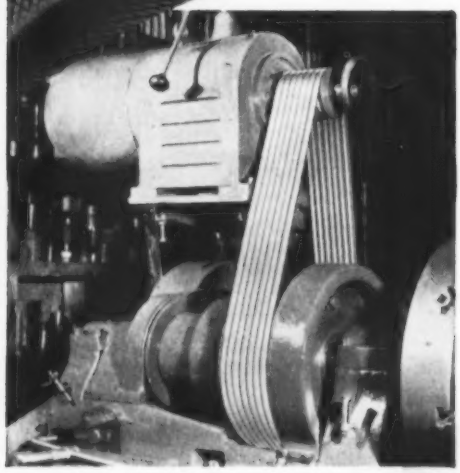
Westinghouse Electric Corporation, Maintenance Sales Department, East Pittsburgh, Pennsylvania. J-95163

YOU CAN BE SURE...IF IT'S Westinghouse

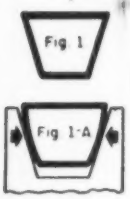
Why Gates V-Belts Wear Longer!

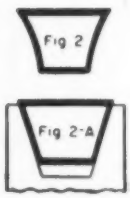


The CONCAVE SIDE
(U.S. Pat. No. 1813698)
tells the story...



Typical Gates Vulco Rope Drive — the Gates V-Belts are built with Concave Sides to insure longer belt wear.





Take any *straight-sided* V-Belt (Fig. 1). Bend it — as if it were going around a pulley. The sides will at once *bulge out* (Fig. 1-A) — and this causes *extra wear* where the bulge is greatest. (See arrows).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

Instead of *bulging*, the precisely engineered CONCAVE SIDES merely *fill out* to *fit exactly* in the sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley so that the *full side* takes the wear — and this means longer belt life and *lower* belt *costs* for you!

When you buy V-Belts, always get the V-Belt with the CONCAVE SIDES — the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-539

V-Belts — Hose
Molded Rubber Goods for industry
World's Largest Maker of V-Belts

Gates® VULCO® ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

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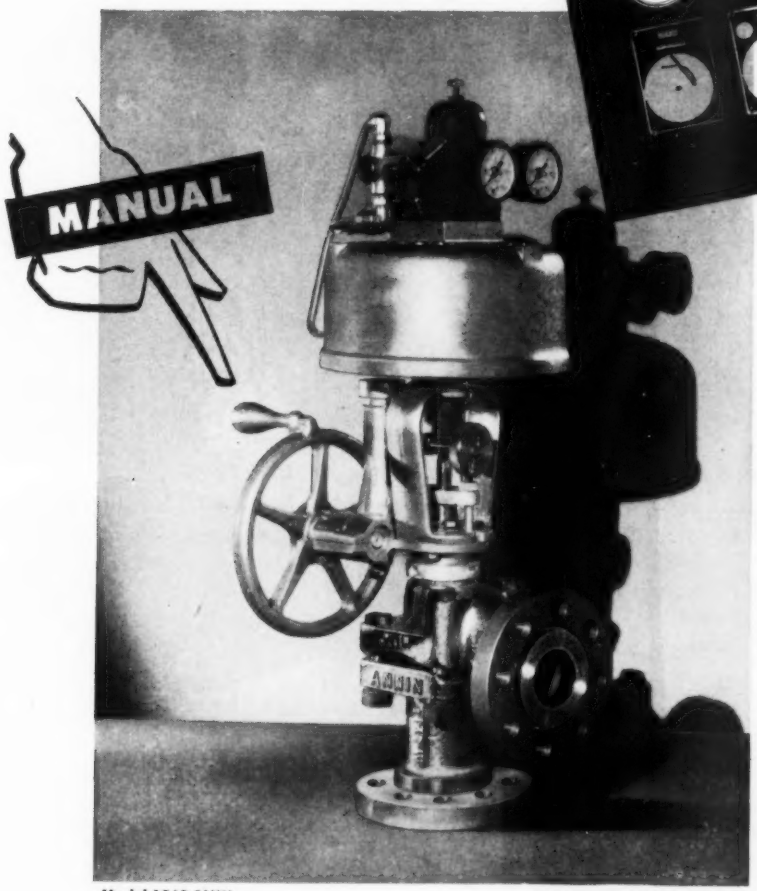
VERSATILITY *plus!*

COMBINATION OF AUTOMATIC-MANUAL OPERATION INCREASES FLEXIBILITY OF ANNIN VALVES...



Model 1560 SMW

To ANNIN's powerful Domotor automatic operation add the versatility of a side-mounted Handwheel. This combination provides the answer to field demands for convenient and positive *supplementary* control during start-up periods, or when the system is shut down temporarily for instrument repair. The Handwheel can act to operate the valve manually and provides an adjustable limit stop in either the opening or closing direction. This auxiliary manual control is particularly advantageous in adjusting the minimum or maximum flow of steam to turbines, steam engines and other process equipment. Further evidence of the increased utilization, simplicity of design and greater economy of ANNIN VALVES.

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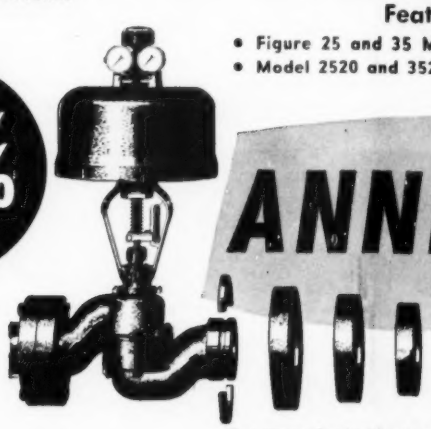
Featuring these NEW Annin products:

- Figure 25 and 35 Manual Valves
- Model 2520 and 3520 Cylinder Valves
- Model 2560 and 3560 Domoter Valves
- Model 5060 Wee Willie Control Valves

CUT INVENTORY 50% WITH



ANNIN *Control* VALVES

THE ANNIN COMPANY 3500 Union Pacific Avenue
Los Angeles 23, California

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Only CARBORUNDUM gives YOU

CARBO

TRADE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, New York

so wide a choice of abrasive tools

You get UNBIASED COUNSEL based on all abrasive methods

Your business, in mass production of parts or finished assemblies, is the problem of generating close tolerance sizes, of producing high surface finishes, of removing stock. The business of CARBORUNDUM is the exclusive ability to recommend and furnish you the specific type of abrasive product which will give you highest quality at lowest cost, on every operation you perform.

Take off-hand grinding, for instance. You can count at least 7 different abrasive methods of off-hand grinding. How can you be *sure* the method you are using is the best —the lowest in cost? By asking CARBORUNDUM . . . for CARBORUNDUM alone has a complete, branded line of grinding wheels *and* abrasive belts *and* tumbling and polishing grains. Only CARBORUNDUM can recommend without bias, on the sole basis of what's best for you.

Or suppose you manufacture fountain pens. You can finish and polish the barrels with abrasive belts or grinding wheels . . . you slit the points with a tiny grinding wheel . . . finish the clips with tumbling abrasives. CARBORUNDUM alone gives you *one-source control* of abrasive quality, on every type of abrasive you use . . . quality that's constant, identical, dependable—thus economical.

Several ways to do one operation? Call in CARBORUNDUM. Several processes on one part? Call in CARBORUNDUM. Either way, you win.

Call your CARBORUNDUM *Salesman or Distributor* today!

He's your best bet for complete stocks, prompt delivery . . . and best of all, experienced counsel on *every* new development in the *entire* field of abrasives. He's in the yellow pages under "Abrasives" or "Grinding Wheels." Phone him today—it's to your profit!

Ready now—your free copy of the new big COATED ABRASIVE SELECTOR catalog . . . containing detailed recommendations for both machine and hand sanding operations on tough and soft metals, glass, plastic, wood. Phone for it today.

RUNDUM

MARK

. . . the ONLY source for EVERY abrasive product you need

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When you buy steam, hot water

STEAM OR HOT WATER UNITS

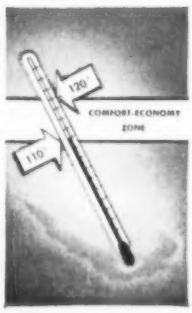
—featuring a great, new line of Modine Verticals

LOOK 'EM

Great, new, improved Modine Vertical Unit Heaters are quieter, lighter, have higher output. Modine also offers a full line of horizontal delivery units.

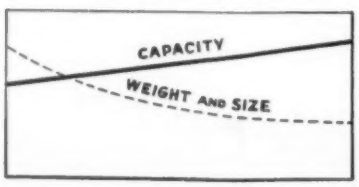
LOOK FOR CORRECT DISCHARGE TEMPERATURES

New Modine Verticals give you discharge air temperatures of 110° to 120° F. correctly related to air velocities. This combination is the key to perfect heating comfort plus lower fuel costs for you.



LOOK FOR GREATER CAPACITY — LIGHTER WEIGHT — LOWER INSTALLED COST

New Modine Verticals provide greater heating capacity because of new high efficiency condenser design. Yet, these *stepped-up* Modines weigh far less, are easier to handle, cost less to install.



LOOK FOR THE BROADER LINE

You have more sizes to choose from when you choose new Modine Verticals. This means it is easier for you to meet specific temperature, air delivery, and location requirements. *But see for yourself!* Call the Modine representative listed in your phone book or write for Bulletin 153 on Modine Steam and Hot Water Unit Heaters today.

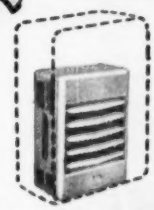
or gas-fired unit heaters....

ALL OVER!

GAS-FIRED UNITS
— Only Modine has stainless steel heat exchangers *and* burners

Modine Gas-Fired Unit Heaters are built in a full line of popular sizes. All are A.G.A.-approved for natural, mixed, manufactured, L.P. and L.P.-air gases.

LOOK FOR EASY INSTALLATION



Advanced stainless design makes Modines 50% lighter in weight — more compact — than the average of seven other leading makes. Installation is faster, easier — no need for special structural supports. On one job, it cost the heating contractor $600 less to install 66 Modines than conventional units — savings he passed on to the owner.

LOOK FOR TOP PERFORMANCE

Not only do Modine units resist corrosion—all tubes heat uniformly because they're individually fired. Burners have elongated ports with four times the free area of ordinary drilled ports for maximum combustion efficiency. Remember: with Modines you are *sure* of getting full rated capacity.

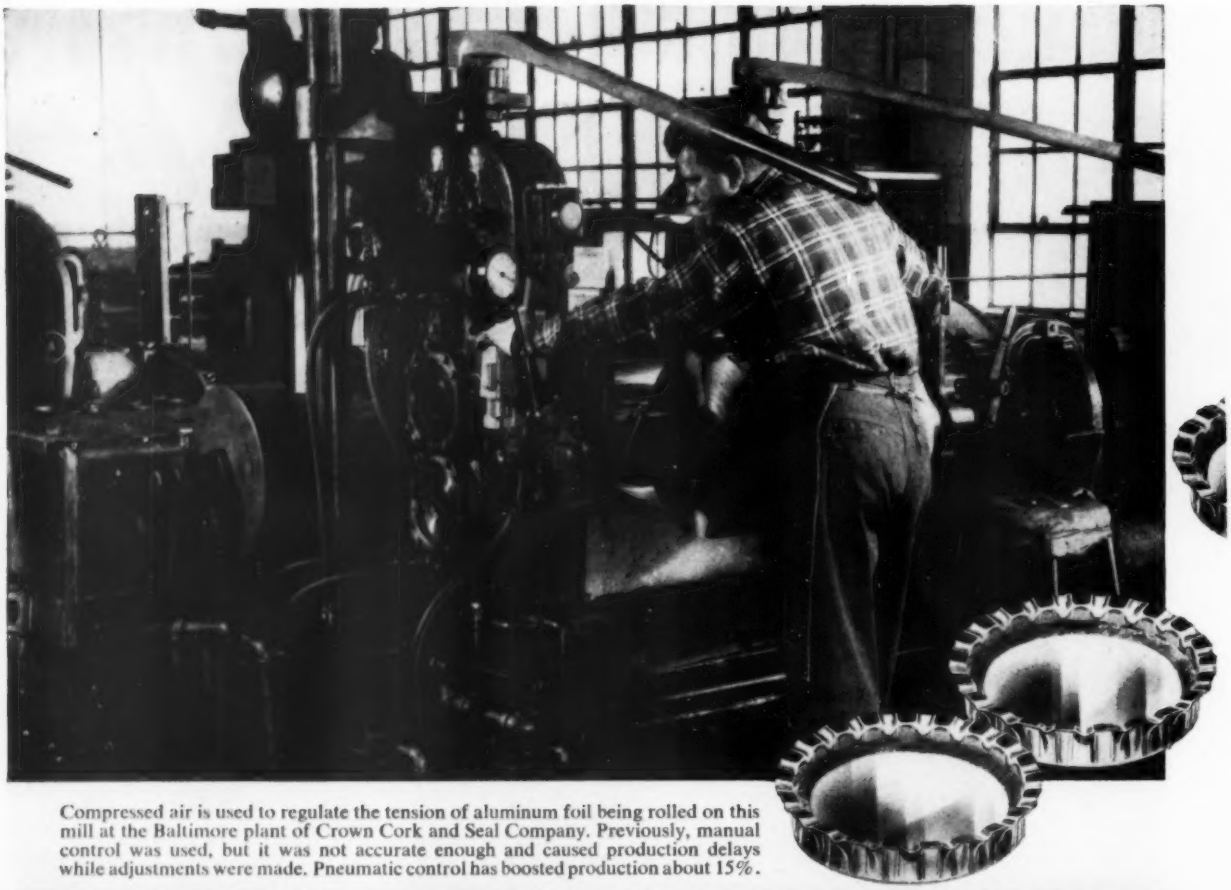
U-1203

LOOK FOR ALL-AROUND VALUE

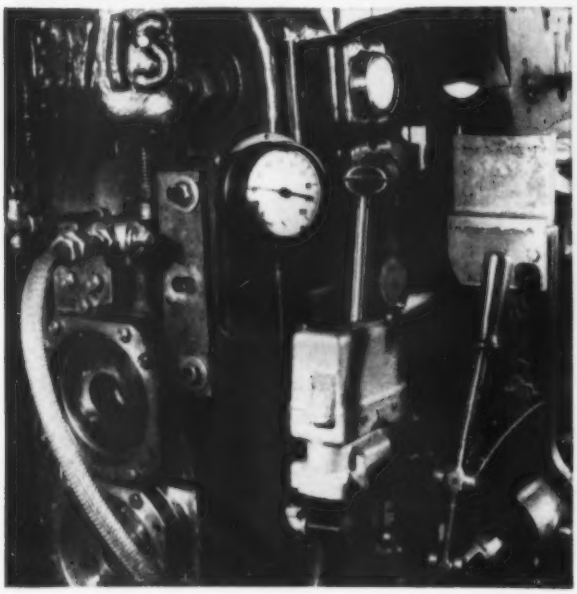
As the leader in the development and application of steam and hot water unit heaters for more than 25 years, Modine brings unequalled experience to gas unit heating problems. It is the only manufacturer to publish heat throw data for gas-fired units. For facts, ask for Bulletin 653. Modine Mfg. Co., 1563 DeKoven Avenue, Racine, Wisconsin.

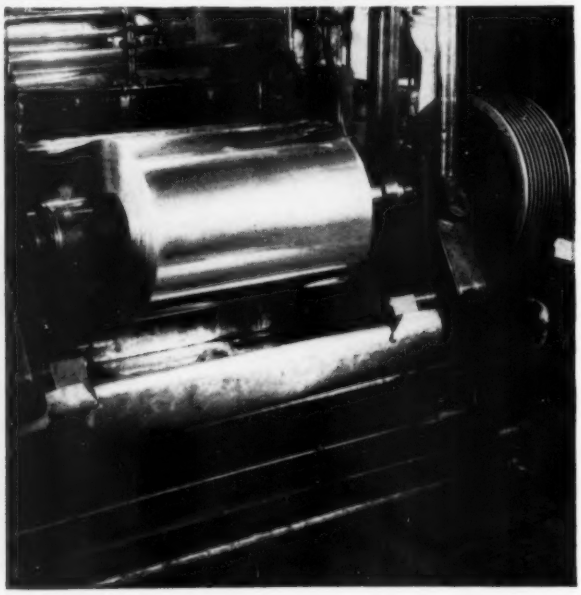
Modine UNIT HEATERS

For more facts circle 510 on Reply Card



Compressed air is used to regulate the tension of aluminum foil being rolled on this mill at the Baltimore plant of Crown Cork and Seal Company. Previously, manual control was used, but it was not accurate enough and caused production delays while adjustments were made. Pneumatic control has boosted production about 15%.

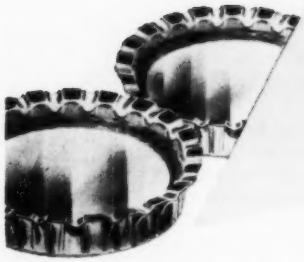


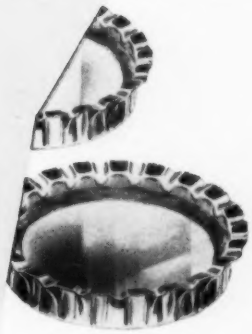


This simple valve . . . controls the tension of this feed roll

Tension is regulated by a pneumatic brake applied to the feed roll. Air pressure determines the amount of braking and is controlled by a Westinghouse Flexair® Valve. Once set, this valve automatically maintains the selected air pressure. The operator can position the valve just by moving his thumb. The great accuracy of this simple control enables Crown Cork and Seal Company to obtain a final thickness within plus or minus 10% of gauge. Scrap losses have been reduced 2% which quickly paid for the cost of the pneumatic control system.

Let AIR do the work





Three air valves, some pipe, and three brakes save 40,000 lbs. of aluminum a year

• You know those little protective discs of aluminum foil under many "Crown" bottle caps? At the big Baltimore, Maryland, plant of Crown Cork and Seal Company, the world's largest manufacturer of these caps, they roll and punch 2,000,000 lbs. of aluminum foil a year just to supply those discs.

It's precision rolling too. With a tolerance of only 1/10,000" on the final thickness. To maintain this hair-splitting accuracy, pneumatic tension control has been installed on all of Crown Cork and Seal Company's rolling mills. It replaces manual control.

Off-size scrap losses have been reduced at least 2%; that's 40,000 lbs. of aluminum a year. At the present price of foil, this saves *$18,000*—several times more than the cost of the pneumatic systems. In addition, production has been stepped up about 15%.

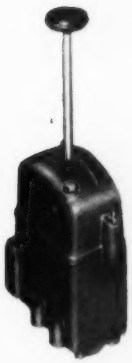
This simple pneumatic system, built around Westinghouse Air Brake controls, *automatically maintains* the correct air pressure. It has been operating 16 to 20 hours a day for the past year, and has proved to be completely reliable.

Our experienced engineers will be glad to help you design a pneumatic control system for your equipment. Just drop us a line.

Westinghouse Air Brake COMPANY

INDUSTRIAL PRODUCTS DIVISION **WILMERDING, PENNA.**

Factory Branch: Emeryville, Calif.
In Canada: Canadian Westinghouse Co. Ltd., Hamilton, Ontario



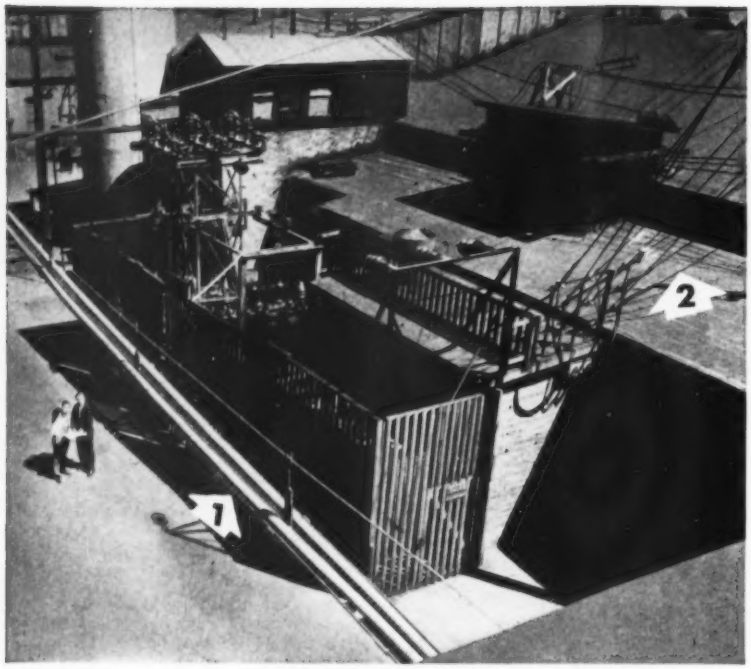
Where to use

WESTINGHOUSE FLEXAIR® VALVES

There is a popular family of Flexair® Valves from which you can pick your requirements for pressure control. Along with their companion Controlair® Valves, they provide control of air pressure for pneumatic cylinders, actuators, clutches, and brakes. Combined with other Westinghouse pneumatic equipment they simplify control and speed up operation of diesel engines, hoists, cranes, and production machines.

We make an extensive line of industrial air compressors, cylinders, valves, chokes, filters, and other pneumatic devices.

For more facts circle 511 on Reply Card



Kaiser-Frazer Cut Installation Costs

Using G-E V-c INTERLOCKED ARMOR CABLE SYSTEM

Kaiser-Frazer Company greatly reduced conductor-installation costs when they modernized a recently-acquired parts plant in Dowagiac, Michigan. They were able to make these savings by using G-E V-c interlocked armor cable to feed 4.16 kv into five load centers for a radial distribution system.

The two armored cables (1) in the picture above are replacing the two dozen low-voltage cables (2) at the right. This picture illustrates the compactness and neatness of the easily-installed G-E V-c interlocked armor cable system on the left as compared to the open wiring shown on the right.

G-E No. 1799 varnished-cambric-insulated interlocked armor cable is light and flexible — long lengths can easily be pulled into position, bent around corners and projections, quickly spliced with simple mechanical joints. The G-E interlocked armor cable installed in racks is always accessible for inspection or system adjustments. For more information, write Section W85-964, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

You can put your confidence in—

GENERAL ELECTRIC

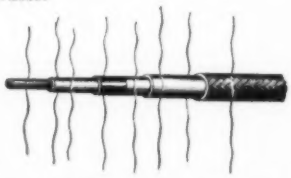
For more facts circle 512 on Reply Card

WIRE AND CABLE IDEAS for Plant Engineers

Cable Application Booklet: Tells how to select, splice, and terminate G-E Versatol* Geoprene 600-volt cable—the all-purpose, rubber-type cable for dependable wiring. Write for your free copy.

New BX* Armored Cable is lighter and stronger: By utilizing glass braid, impervious to rot and flame, G-E has developed a new, smaller-diameter BX cable that carries U. L. listing. It is lighter, stronger, and easier to pull through drill holes than ever before.

Heavy-duty Portable Cords: Designed for heavy-duty portable electric equipment, in garages, factories, and wherever severe service conditions are encountered. G-E Type S rubber-jacketed cords are tough, flexible, durable, and resistant to most acids, alkalies, and water.



For high-temperature wiring—G-E Deltabeston*: Let your G-E Construction Materials distributor help you select the right Deltabeston wire or cable for protection against moisture, oil, corrosive vapors, or abrasion — as well as for average or extreme heat conditions.

how to provide
PROTECTION · *PLUS*

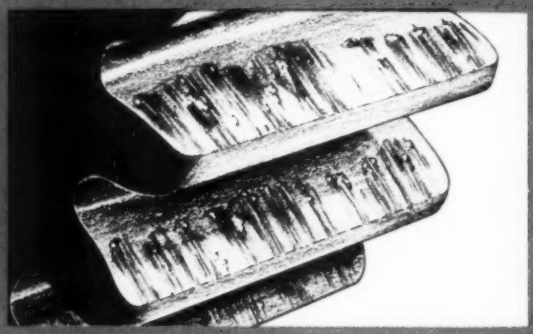
SWITCH TO GULF E.P. LUBRICANTS

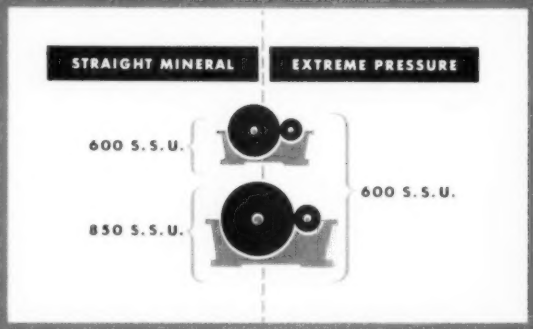
. . . and save maintenance dollars!

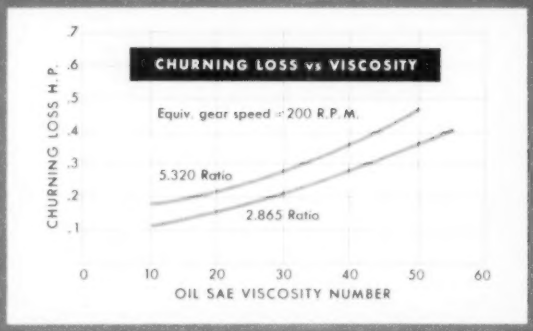
Gulf E. P. Lubricants combine all the properties that count in an extreme pressure lubricant: high film strength, excellent rust preventive properties, good water-separating characteristics, good stability, and they are noncorrosive, nonfoaming. Their use insures longer gear and bearing life and lower maintenance costs for gear drives under a wide range of operating conditions.

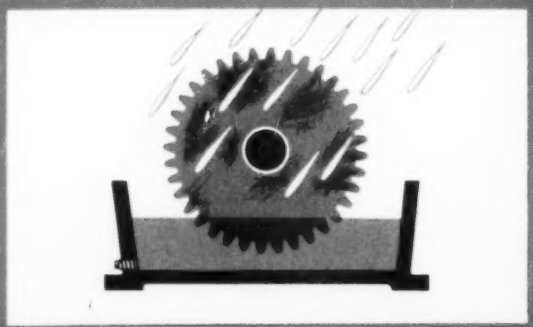
Gulf E. P. Lubricants are available in the proper viscosity for every gear requirement ranging from 55 to 1000 SUV at 210 deg. F. For specific recommendations for your equipment, call in a Gulf Sales Engineer today. Write, wire, or phone your nearest Gulf office or send the coupon on the last page.

GULF INDUSTRIAL LUBRICATION









Practical advantages of Gulf E. P. Lubricants:

More effective protection against tooth scoring and welding

Gulf E. P. Lubricants have proven ability to protect gear teeth against damage by scoring and welding. They are specially compounded to provide extra film strength and to prevent metal-to-metal contact under most conditions of overload and shock load. That's why you can usually avoid tooth damage like that shown at the left when you use Gulf E. P. Lubricants. And that's why they provide an extra margin of protection when production demands approach or exceed the rated capacity of the equipment.

Fewer lubricant grades needed—lubricant storage and handling simplified

Because Gulf E. P. Lubricants have superior film strength, it is often feasible to use a lower viscosity grade than would be possible with a straight mineral oil. This is a practical advantage for plants operating several different types of gear drives. If, as pictured at the left, two straight mineral oils of different viscosity are specified, one grade of Gulf E. P. Lubricant may well do the job of both. Thus lubricant storage and handling is simplified, and there is less chance for confusion in the oil house.

Reduced power loss caused by churning in splash-lubricated units—lower power costs

There is another advantage in using a lower viscosity oil in splash-lubricated units where power loss due to churning is appreciable. Since this loss is almost directly related to oil viscosity, the use of lighter Gulf E. P. Lubricants often means reduced heat generation and lower power costs.

The chart at the left shows the effect of viscosity on the churning loss in horsepower of a typical gear unit.

Excellent protection against rust

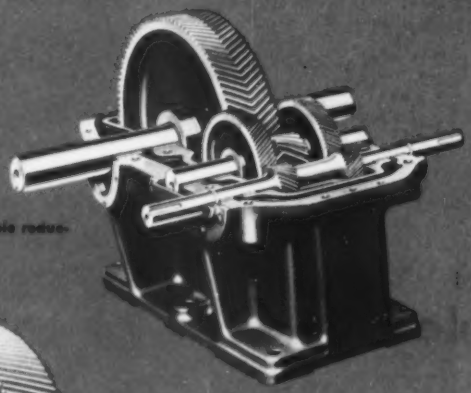
The ability to protect polished gear teeth and antifriction bearings against rust is an important property of a gear lubricant, and is essential in a lubricant for units which are occasionally idle.

Gulf E. P. Lubricants have highly effective rust preventive properties—insure against excessive wear and enlarged tolerances which might result from the presence of abrasive rust particles.

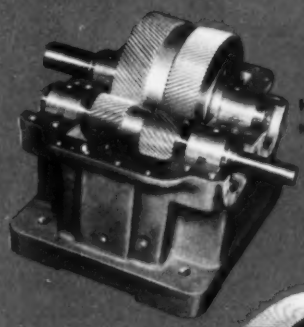
other advantages

- good water-separating characteristics
- non-corrosive
- non-foaming
- stable for this type of lubricant

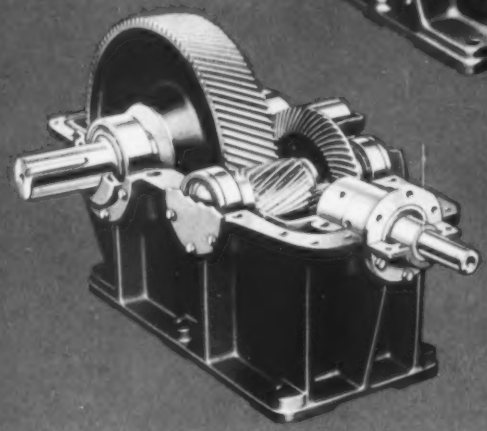
make Gulf E. P. Lubricants ideal for:



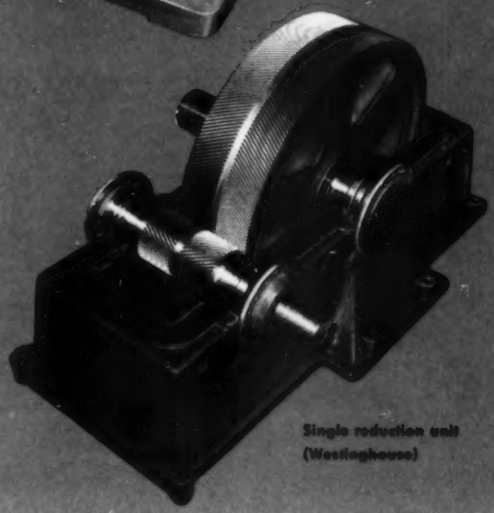
Parallel shaft double reduction unit (Falk)



High speed, single reduction unit (Westinghouse)



Double reduction, right angle drive (Falk)



Single reduction unit (Westinghouse)

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pa.

Gentlemen:

I would like further information on Gulf E.P. Lubricants:

- ☐ Please have a Gulf Sales Engineer call.
- ☐ Please send me a copy of your pamphlet "Gulf E.P. Lubricants for Reduction Gear Drives."
- ☐ Please arrange to show a group in our plant the new Gulf Color Slide Film, "Gears and Their Lubrication," Part I.

Name _____

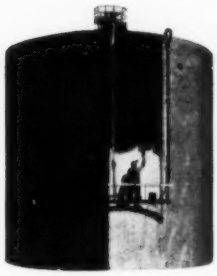
Company _____

Title _____

Address _____

GULF INDUSTRIAL LUBRICATION

"Who said people don't like Black?"



Pitt Chem coatings withstand years of exposure to a wide variety of atmospheric and chemical conditions.

LET'S TALK SENSE about the color of protective coatings. Pitt Chem Tar Base Coatings, for example, are as black as the ace of spades. Our service engineers would never recommend them for the walls of your office. But—for the protection of equipment and structures against corrosion, we think their color is the most practical one you could select. And a recent survey shows that plant people agree with us. They select black as one of the two most popular of all industrial coating colors. Why?

It doesn't fade. It "goes" with all other colors.

It doesn't require cleaning. It creates no glare.

And remember this: The black color of Pitt Chem Tar Base Coatings tells you they're made of one of the most impervious and durable of all protective materials—coal tar pitch. For long-lasting, economical protection against most mineral acids, alkalis, corrosive vapors and moisture, there's no finer protective material on the market today. ● If you have a corrosion problem write or call a Pitt Chem Coating Specialist today. He'll gladly make recommendations . . . without cost or obligation.

PITT CHEM 101—For Severest Conditions
PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Compound
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Specialty Coating

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COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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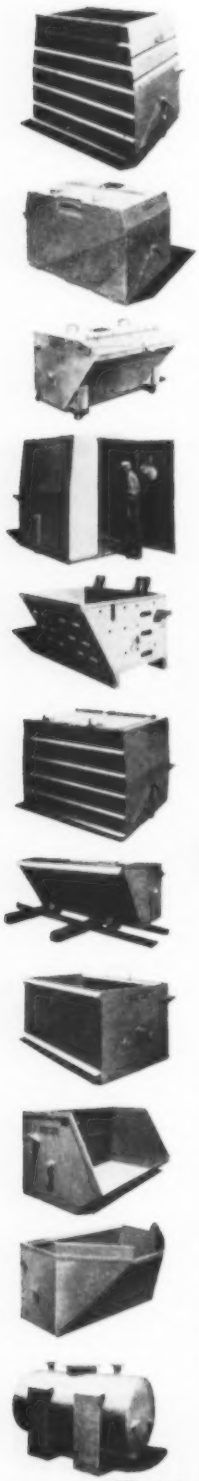
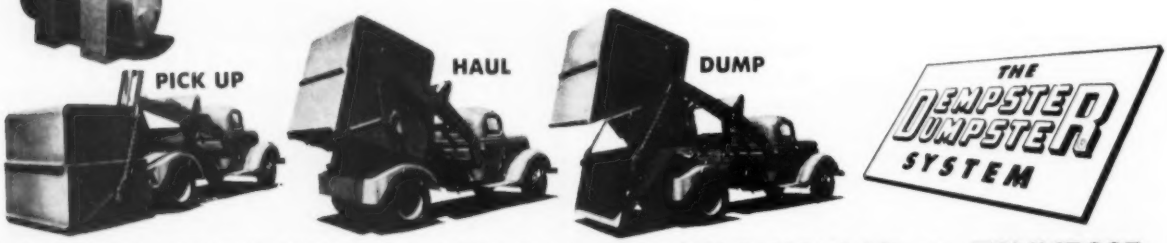


You will Dump High Costs, too..

. . . when you install the Dempster-Dumpster System of Bulk Materials Handling

Manufacturers over the nation have learned to eliminate the costly and inefficient method of handling bulk materials with conventional dump trucks, drivers and loading crews. You can equip one truck with a hydraulically operated Dempster-Dumpster. Then, inside or outside buildings at convenient accumulation points, you simply place detachable Dempster-Dumpster Containers, in capacities up to 4 times that of conventional dump truck bodies, with each designed to suit the materials to be handled—be they solids, liquids or dust . . . hot or cold . . . bulky, light or heavy. Containers shown at left, all handled by one Dempster-Dumpster, are only a few of the many available or that can be built to meet your needs. The Dempster-Dumpster, operated by only one man, the driver, serves scores of containers . . . one after another, as shown below.

You eliminate trucks standing idle. You eliminate re-handling of materials. You eliminate loading crews. You increase efficiency, sanitation and good plantkeeping with this Dempster-Dumpster System—the lowest cost method of bulk materials handling ever devised. Write to us for complete information. Manufactured exclusively by Dempster Brothers, Inc.

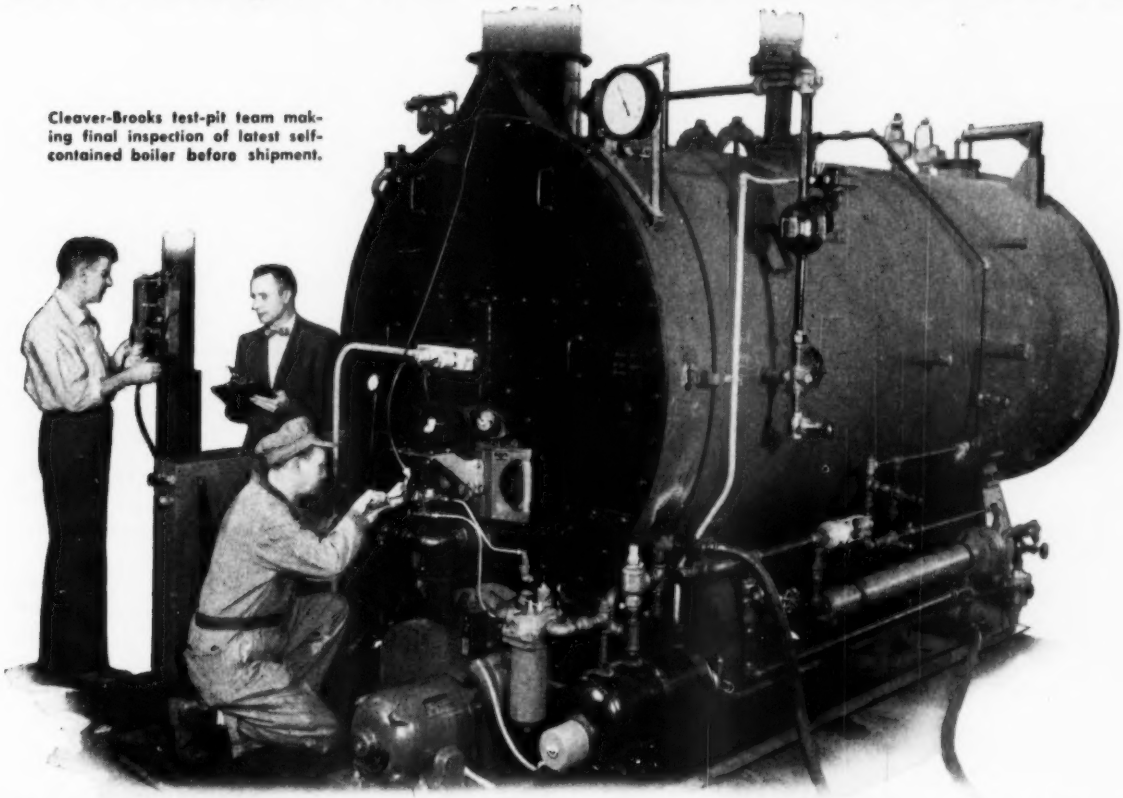


DEMPSTER BROTHERS, 193 SHEA BLDG., KNOXVILLE 17, TENNESSE

For more facts circle 517 on Reply Card

their counterpart "Test-Pilots" have at Cleaver-Brooks

Cleaver-Brooks test-pit team making final inspection of latest self-contained boiler before shipment.



HIGH SCORES . . . on factory and on-job tests guarantee greatest return from boiler investment

When test pilots give the familiar "O.K." — that's the sign of proven performance. It's the same with boilers in the Cleaver-Brooks plant. Only after accurate, thorough inspection and testing under actual operating conditions do boilers get the final "O.K." from experienced test engineers. That's why you get guaranteed 80% efficiency from your Cleaver-Brooks boiler.

A record of this test is available to every buyer on request. In fact, you as a buyer, consultant, or contractor are invited to witness the actual test on your Cleaver-Brooks boiler before shipment.

And further, Cleaver-Brooks boilers are placed in operation at the job site by factory service engineers who check installation, train your operators and make complete and detailed field tests.

So, when you buy a boiler, insist on factory tests as well as field service tests by qualified engineers. There is no better way of insuring yourself of the very best value money can buy and the greatest return from your boiler investment. Look to Cleaver-Brooks, the leader in the "Packaged" Boiler field for two decades. Write today for latest Catalog AD-100.

Available for oil, gas and combination oil/gas firing.

CLEAVER-BROOKS COMPANY
Dept. K-307 E. Keefe Ave.
Milwaukee 12, Wisconsin, U.S.A.

Cleaver-Brooks
Originators of the Self-Contained Boiler

BOILERS — STEAM OR HOT WATER — FOR HEATING AND PROCESSING IN SIZES FROM 15 TO 500 HP, 15 TO 250 PSI

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AIR CAN BE JUST AS IMPORTANT TO YOU!

When his air supply runs out, the "smoke-eating" fireman is out of business . . . possibly permanently. In a business sense, your plant air supply can be just as important.

Inadequate dust or fume control seriously threatens operating efficiency, employee morale, plant-community relations, profits.

Air is the all-important tool in dust and fume control. The Kirk & Blum organization specializes in putting "clean air . . . the invisible tool" to work in virtually every industry. In 46 years, Kirk & Blum engineers have designed, fabricated and installed thousands of dust and fume control and special air handling systems. With Kirk & Blum you have one source—one responsibility for the entire job.

Kirk & Blum will confer with you on any dust or fume problem you may have. Write: The Kirk & Blum Mfg. Co., 3189 Forrer St., Cincinnati 9, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST AND FUME CONTROL

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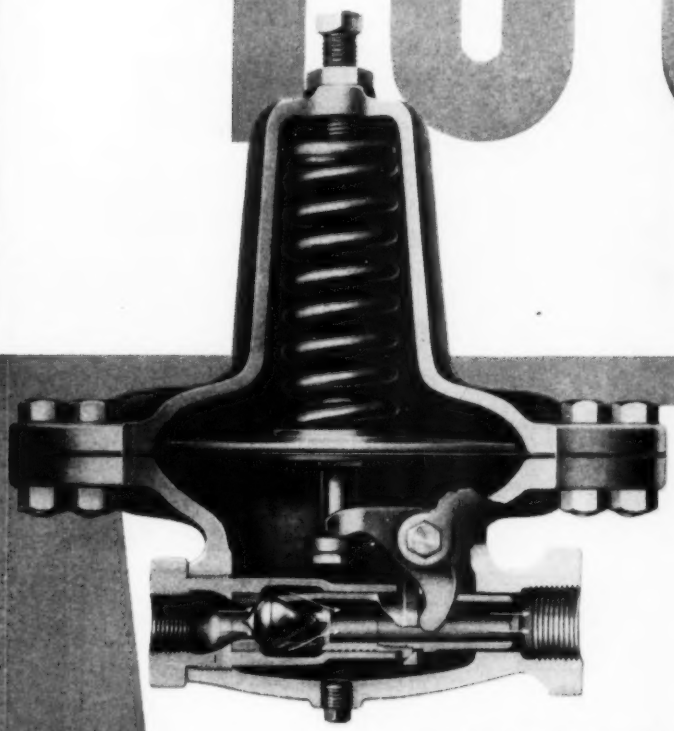
TYPE 1000 VALVE



Any product of quality should be dependable when *ordinary* products fail. Sudden pressure fluctuations, dirt, scale and viscous matter prove "fatal" to ordinary pressure reducing valves.

The CASH STANDARD TYPE 1000 VALVE however, is designed to operate with complete dependability under the most difficult and unusual circumstances. Many of these units have been in service over 10 years and have never been taken "out of the line."

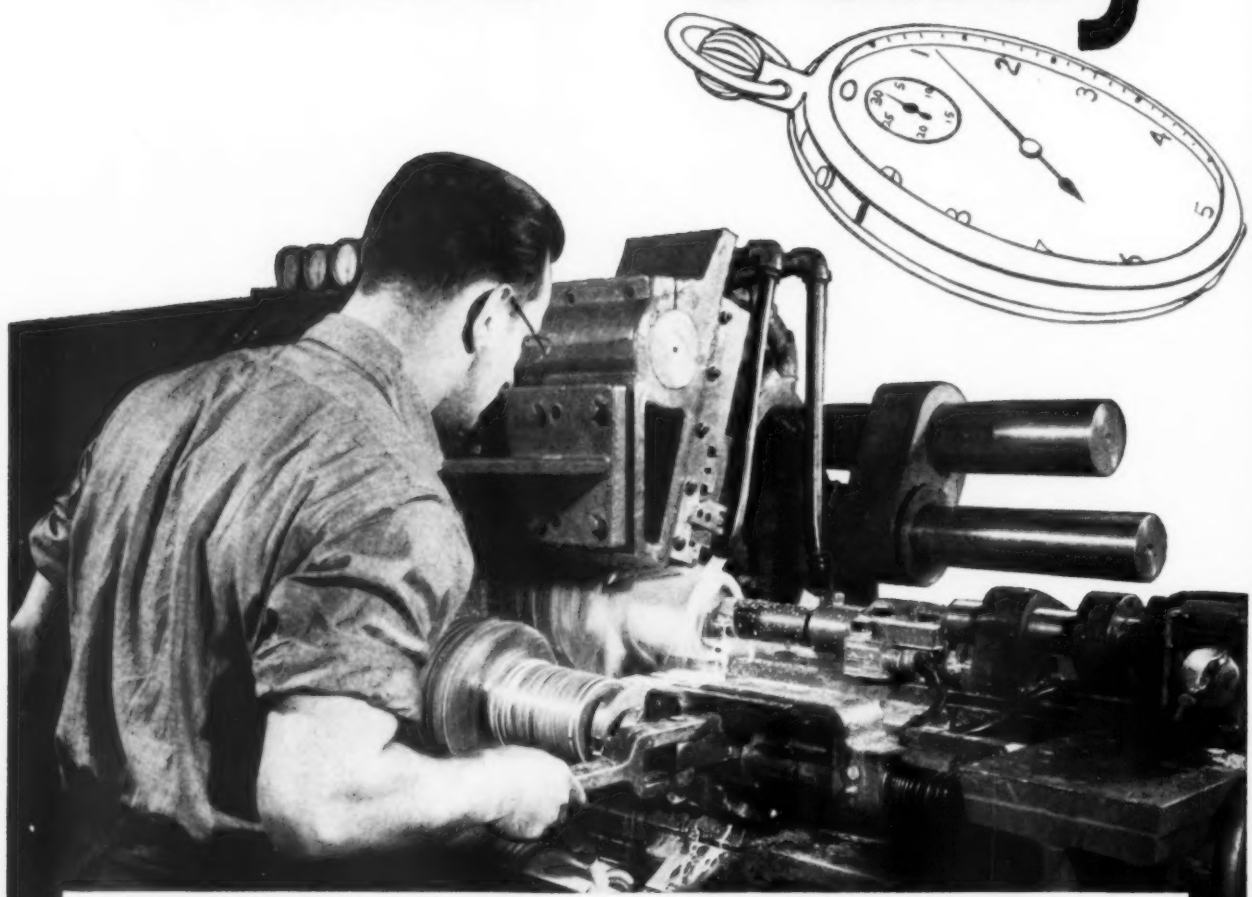
Truly an *EXTRAORDINARY* achievement of quality and design excellence.

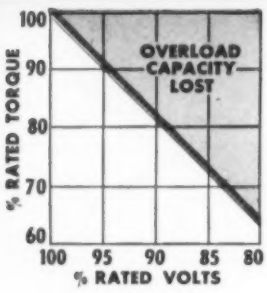
INSTALL CASH STANDARD "TYPE 1000" VALVES

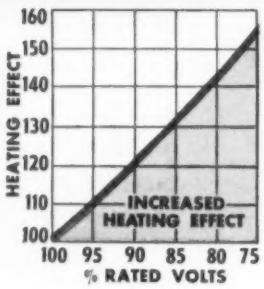
CASH STANDARD **DECATUR, ILLINOIS**

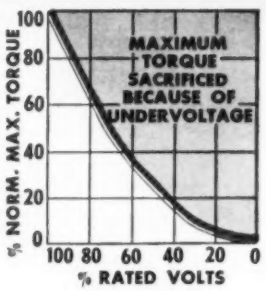
A. W. CASH COMPANY

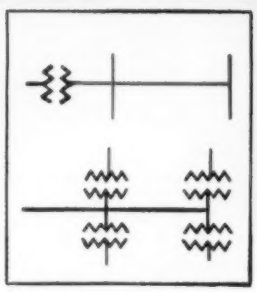
Time-Study











FULL PRODUCTION demands that rated voltage be maintained to all motors. Overload capacity, that extra push necessary for short intervals on many processes, falls off rapidly on undervoltage . . . falls approximately 10% for every 5% drop below rated voltage.

MOTORS BURN OUT quicker at undervoltage because of increased heating effect. Overload relays in the controls protecting your motors trip because of the extra current through them, open circuits to motors — cause machine down-time and production loss.

JOBS TAKE LONGER because torque and horsepower drop when voltage drops. Less torque means lighter cuts on lathes, shapers and other machine tools. More time must be spent to get the same job done. More overhead, more manhours must be figured into every job.

A MAJOR CAUSE of undervoltage is voltage drop in secondary feeders. Existing systems may not be adequate for new production schedules. Install A-C Substations at load centers to reduce line losses, cut feeder length, hold proper voltage, increase production.

Your Voltage

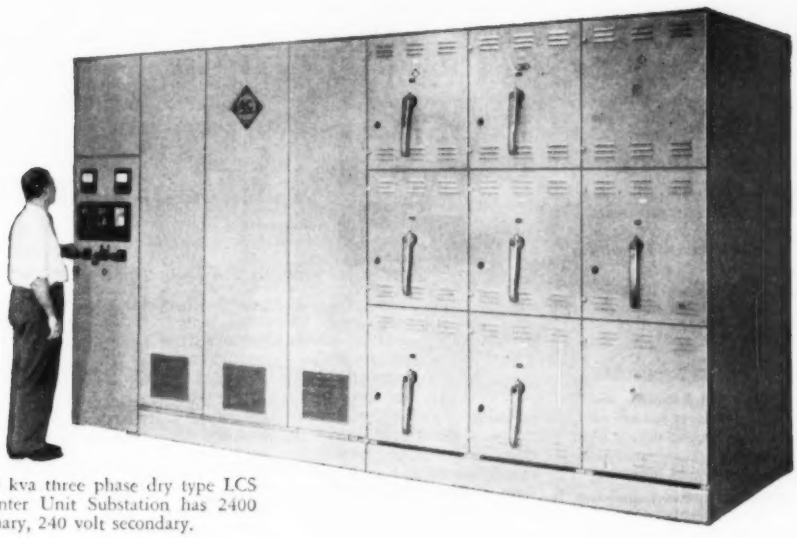
STOP WASTING MANHOURS on slow producing machines. Get the most from the production equipment in your plant by installing unit substations to correct undervoltage. No electrical equipment gives top performance *unless* it operates at rated voltage . . . and even well designed distribution systems may prove inadequate because of today's added loads and increased production schedules.

For example, if your squirrel-cage motors operate at 10% undervoltage, maximum torque available to start machinery is reduced 19% . . . heating effect within the motors is inceased 21% . . . overload capacity falls, efficiency drops.

Increase your output by eliminating production slow-downs resulting from overloaded motors . . . machine down-time due to tripped starters or circuit breakers. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install, and provide protection to personnel.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletins 11B6285A, 11B6325B and 11B6895. A-3371

LCS
LOAD CENTER
Unit Substation



This 750 kva three phase dry type LCS Load Center Unit Substation has 2400 volt primary, 240 volt secondary.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

For more facts circle 521 on Reply Card

SAVE

Maintenance AND Towel Costs WITH

Sani-Dri
ELECTRIC
HAND OR HAIR DRYERS
SAVES MAINTENANCE EXPENSES!
New No. 8 wall model with patented, faster-drying features!
ELIMINATES TOWEL EXPENSE . . . SAVES STORAGE SPACE
ELIMINATES TOWEL LITTER

Save valuable maintenance time and eliminate continuing towel expense. New high-speed Sani-Dri provides quick, automatic hand or hair drying service 24 hours a day year after year! Sani-Dri is a permanent solution to your washroom sanitation and drying problem . . . and SAVES UP TO 85% OF YOUR WASHROOM COSTS!

NEW FASTER-DRYING FEATURES!

- *New faster-drying heating element!*
- *New smaller, oval nozzle produces more concentrated stream of air!*
- *Instant starting push-button switch with automatic shut off!*

All Sani-Dri Electric Dryers are GUARANTEED, and have carried the Underwriter's Seal of Approval for over 18 years!

New Brochure!

Shows all Sani-Dri hand and hair dryer models with new high-speed drying features . . . plus installation pictures. Write today!

Manufacturers of Stools, Table Bases and Costumers for Restaurants and Soda Fountains.

Distributors in Principal Cities

THE CHICAGO HARDWARE FOUNDRY CO.

"Dependable Since 1897"

4693 Commonwealth Ave.

NORTH CHICAGO, ILLINOIS

For more facts circle 522 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Glass Lining for Smoke Stack

PLANT ENGINEERING:

"In the July, 1953 issue, page 116, you have published an article on glass lining for a smoke stack fabricated by A. O. Smith Corp.

"We are interested in some technical information and therefore would like to know the address of the above mentioned company." *A. H. George, Ocean Shore Iron Works, San Francisco, California.*

Fred Haeuser, Public Relations Department, A. O. Smith Corp., Box 584, Milwaukee, Wisconsin, is the man to contact for more information.—*The Editors.*

Course for Plant Engineers

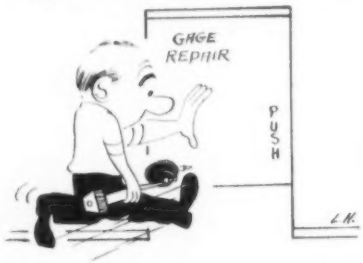
PLANT ENGINEERING:

"Kindly send me two copies of the article in the May, 1953 issue entitled 'Northwestern University's New Course for Potential Plant Engineers.'" *T. Hardgrove, Mechanical Engineering Dept., California State Polytechnic College, San Luis Obispo, California.*

Further Discussion on Safeguarding Records Center

PLANT ENGINEERING:

"It is our continued feeling that the article by Messrs. Leahy and Clarke 'Planning a New Records Storage Center —Now a Current Problem,' which appeared in the March, 1951 issue, has not given sufficient consideration to the protection of records in combustible containers. It would seem advisable to incorporate a further article in your



publication setting forth additional facts to acquaint industrial managements with the effectiveness of various extinguishing equipment for records vaults.

"Certainly, the omission of automatic sprinklers and room-flooding carbon dioxide systems could result in total record destruction. Our experience with automatic sprinklers has been that loss is kept at a minimum with sprinklers since wet records can be reproduced, and national statistics conclusively prove that sprinklers provide protection with a minimum of water discharge. Our best estimate of the possibility of premature operation of sprinkler heads is one head in several million." *J. O. Herbster, Assistant Chief Engineer, Firemen's Mutual Insurance Co., Providence, R.I.*

Mr. Leahy replies:

"For ten years, those of us who have been spearheading the establishment of modern records centers have consciously avoided sprinkler systems. We are continuing to do so. Nor do we wish to engage in controversy thereon with the sprinkler equipment industry. Fireproof buildings, safe locations, fire controls, and patrolled areas usually are incorporated in our plans. This is the pattern first set by the National Archives, built in 1934 after exhaustive study and with cost no object.

"In short, those of us who have set up or planned more than 50 modern records centers in both government and industry in the last decade are stressing planning and management rather than any one piece of equipment to safeguard the records entrusted to these centers." *Emmett J. Leahy, President, National Records Management Council, New York City, New York.*

Maytag Program for Apprentices

PLANT ENGINEERING:

"In your last letter you requested photostatic copies of letters inquiring about our apprentice training program which you described in Plant Engineering for April. We have the addresses of these companies so we are able to forward the original copies of the letters. Thanks for the twenty copies of the article." *Robert H. Jones, Training Assistant, The Maytag Company, Newton, Iowa.*

This was one of Plant Engineering's "pre-tested" articles. Before gathering data we first checked with many of our plant engineer friends regarding the potential interest in such material. The interest rating was high so we went ahead with the article with the usual splendid cooperation of The Maytag Company. The excellent reader response directed to us and to The Maytag Company bore out the efficacy of our "pre-sampling."—*The Editors.*

Interested in Tool Control

PLANT ENGINEERING:

"In the June, 1953 issue on page 82 you had a comprehensive article about tool control.

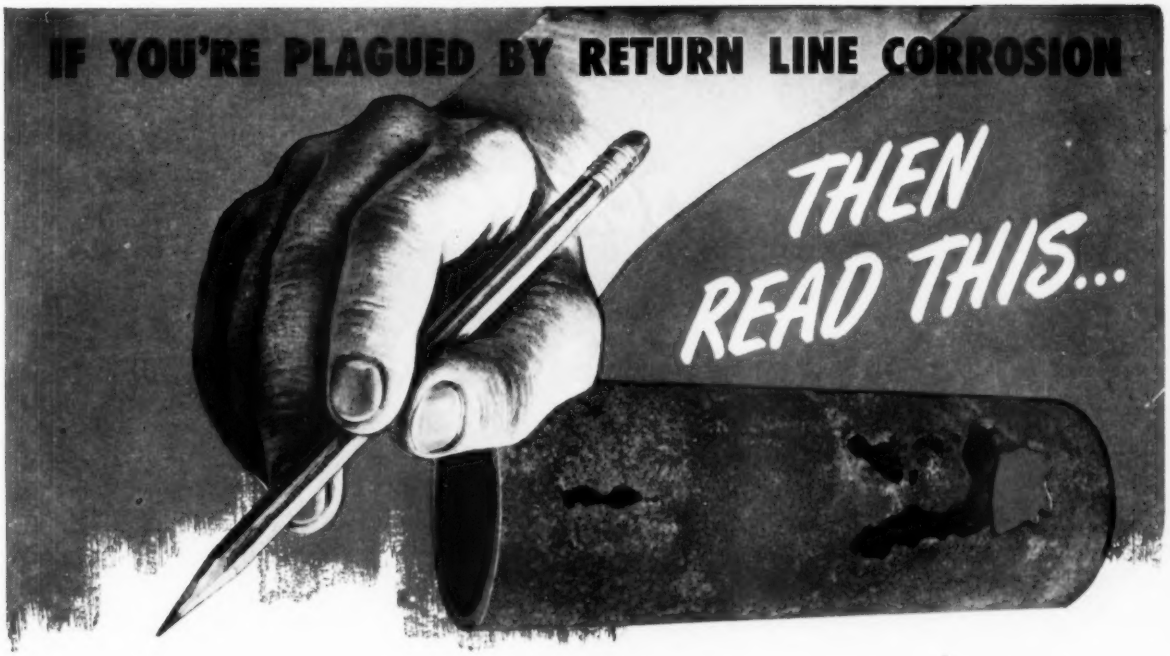
"Since we are interested in tools and inventory of tools, would you please send us three tear sheets of this particular article and any other article of such nature which you might have available." *Lou Liebl, Process Engineer, Doehler-Jarvis Division of National Lead Co., Toledo, Ohio.*

Tear Sheets of Propane Article

PLANT ENGINEERING:

"I am very much interested in the article by H. R. McNeely in the June, 1953 issue 'Propane Standby Means No Production Interruption.'

"Will you please send me a tear sheet for my file." *J. S. Salonimer, Design Engineer, Technical Facilities and Services, Research Laboratories Division, General Motors Corp., Detroit, Mich.*



As an engineer responsible for efficient, economical plant operation, you know only too well that corrosion of steam and condensate lines can send costs skyrocketing through pipe replacement, interrupted production, and increased labor and maintenance. Perhaps you, like many other engineers, have tried stop-gap methods to check the problem only to find them partially effective or far too costly.

Realizing the importance of this major industrial problem, Betz Laboratories has developed its patented filming amine treatment. Here, at last, is a simple, inexpensive, and practically 100% effective method of eliminating this costly and production-disrupting headache.

For example, a linoleum company, operating at 150 psi and producing 300,000 pounds of steam per day, employed sodium zeolite softening for a high bicarbonate raw water. The carbon dioxide content of the steam averaged 40 ppm. Continued maintenance was required due to failure of condensate lines from the steam kettles and unit heaters. After the filming amine treatment was applied, maintenance records showed an annual saving of approximately $8,000.00! And, a large part of this saving was obtained by eliminating weekend over-time work on pipe replacements.

Why not take the first step toward ridding your plant of corrosion *now*? Call in a Betz Engineer. Ask him to show you how Betz *Specialized* Water Conditioning Service can help you . . . quickly . . . economically . . . effectively. W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: Betz Laboratories Limited, Montreal 1.

See for yourself how Betz filming amine treatment eliminates return line corrosion and reduces operating costs. Send for Technical Bulletin No. 124.

BETZ

CONSULTANTS ON ALL WATER PROBLEMS

For more facts circle 523 on Reply Card

Now-Standardize on TAPER-LOCK

Now, for the first time, you can have all the benefits of standardizing on a truly modern method of mounting wheels on shafts . . . through the famous Dodge patented Taper-Lock design.

The time-saving, cost-cutting performance of Dodge Taper-Lock . . . already proved in millions of installations of Taper-Lock Sheaves, Couplings and Conveyor Pulleys . . . is now available in a complete line of Taper-Lock Sprockets with Dodge Roller Chain.

The bushing pictured here fits into the hub of every one of the Dodge products shown—sprockets, sheaves, couplings, conveyor pulleys. Both tapered bushings and hubs are precision machined to achieve perfect interchangeability. The result is less down-time on machines, simpler maintenance, reduced inventories. Taper-Lock gives you an unmatched opportunity to lower your costs and keep production rolling.

Dodge Taper-Lock grips the shaft for the full length of the bushing—holds with the firmness of a shrunk-on fit, yet comes off easily, quickly.

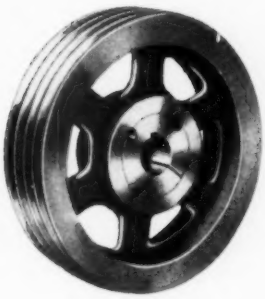
Taper-Lock's exclusive advantages were never more strikingly proved than in the new line of sprockets recently introduced by Dodge. For Taper-Lock brings to sprockets a new "off-the-shelf" availability. No time-consuming and costly reboring, key seating, drilling and tapping for set screws, needed to fit them to the shaft! Dodge Taper-Lock is available in both driver and driven sprockets from No. 40 to No. 100, up to 112 teeth. Taper-Lock bushings to fit shafts from ½" to 10" are available from stock.

Consider carefully the cost-saving advantages you get by standardizing on Taper-Lock — the modern method of mounting wheels on shafts. For further information, call your Dodge Distributor, or write the factory.

DODGE MANUFACTURING CORPORATION, 2700 Union Street, Mishawaka, Indiana

TAPER-LOCK SPROCKETS and Dodge Quality Roller Chain

— THE MODERN WAY TO MOUNT SPROCKETS



TAPER-LOCK SHEAVES

— THE MODERN WAY TO MOUNT SHEAVES

TAPER-LOCK COUPLINGS Rigid and Flexible

— THE MODERN WAY TO MOUNT COUPLINGS

— THE MODERN WAY TO MOUNT CONVEYOR PULLEYS

TAPER-LOCK SOLID-STEEL CONVEYOR PULLEYS

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book.

DODGE

of Mishawaka, Ind.

For more facts circle 524 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Weight Helps Ladder Climbing

A SIMPLE one-man derrick elevator, resulting from a suggestion by a Humble drilling crew member, is making the work of derrickmen easier, safer, and a lot more pleasant.

This elevator calls for a counterbalance which offsets most of the derrickman's weight and enables him to climb up and down the towering derrick with amazingly little effort.

During drilling operations, much of the derrickman's working time is spent on the "monkey board," a narrow platform perched high above the drilling floor. To get there, he must climb up the side of the derrick.

This ladder-climbing chore was not much of a problem in the early days of wooden derricks and short sections of drill pipe. But, as derricks grew taller and the "monkey board" moved higher, the derrickman's climbing duties became more time consuming.

Today, a standard drilling derrick may extend 136 feet into the air. And the "monkey boards" are now located some 90 feet above the derrick floor.

A simple elevator designed by derrickman Louis F. Postert eliminates the fatigue and most of the hazards of derrick climbing.

Derrickman shown below the platform near the top was aided in his long climb by the counter-weight on the right.

The gadget has a long cable that runs through a sheave, or pulley, attached to the derrick at the head of the ladder. At one end of the cable is a double safety belt; on the other end is a weight made from a segment of steel casing. This counter weight, suspended on two pulley wheels, glides up and down the guy wire of the derrick.

To use the elevator, the derrickman merely secures the double safety belts about his body, then climbs the ladder in the usual manner. As he climbs upward, the weight on the other end of the cable glides down the guy wire, counterbalancing most of the man's weight.

Despite its extreme simplicity, this device has many points in its favor. It enables the derrickman to go up the ladder with much less effort and with much greater safety. It speeds up the rate of ascent and eliminates the need for rest stops. Since the derrickman can now climb to the "monkey board" without fatigue, he can do his work there with more efficiency and greater safety. *From the Humble Way, published by Humble Oil & Refining Company, Houston, Texas.*

Causes of Battery Sulphation

WHEN A BATTERY is charged repeatedly at low rates the acid is not effectively driven out of the plates, particularly the lower parts, and sulphation results. Repeated partial charges, stopping before there has been sufficient gassing to effect a thorough mixing of the electrolyte, results in sulphation.

It is difficult in normal battery

Newly Hired Men are Furnished with Sterilized Hard Hats for a Safe and Clean Start

EVERY NEW construction job undertaken by Dravo Corporation of Pittsburgh, Pa. brings problems of recruiting new employees, instructing them on the company's safety policies and hazards.

During the initial briefing period they are issued necessary personal equipment such as safety hats. Since the cost of safety items, multiplied by the number needed, runs into an appreciable total, they must be reclaimed at the completion of each project. Cleaning and sterilizing of equipment before reissue is easy.

However, in addition to this, there must be proof for the next wearer that the articles are cleaned and sanitary. Direct evidence of cleanliness plays an important part in gaining the employee's full cooperation in the safety practices.

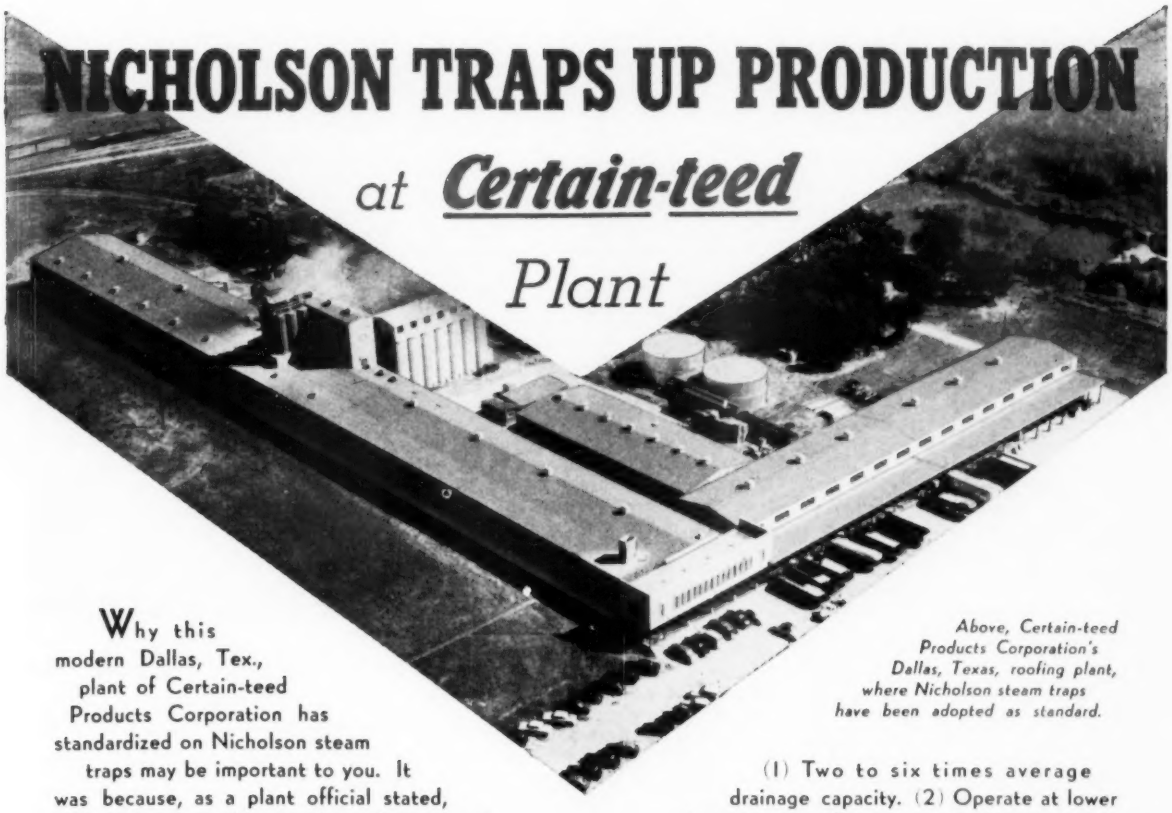
Current practice, which has received immediate and enthusiastic approval, is to repackage personal safety equipment immediately after cleaning and sterilizing.

After every hat is cleaned, sterilized and fitted with a new sweatband, the final touch is to seal the hat inside a transparent plastic bag where it remains until removed by the next wearer.

With such first-hand evidence there should be no question in his mind as to the sanitary condition of his hat. It has a fresh, clean look because it has been protected against dust and handling since the day it was sterilized. *From Dravo Review, published by Dravo Corporation, Neville Island, Pittsburgh, Pa.*

Sweatbands are removed from used hats prior to scrubbing and sterilizing. Then the new sweatbands are inserted and the hats are sealed in transparent bags

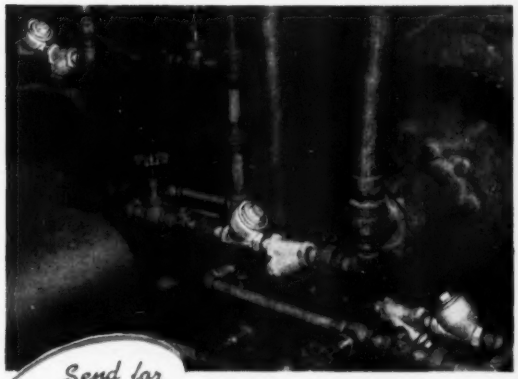
NICHOLSON TRAPS UP PRODUCTION at *Certain-teed* Plant



Above, Certain-teed Products Corporation's Dallas, Texas, roofing plant, where Nicholson steam traps have been adopted as standard.

Why this modern Dallas, Tex., plant of Certain-teed Products Corporation has standardized on Nicholson steam traps may be important to you. It was because, as a plant official stated, "Nicholson traps have cut loss of steam and improved operations generally". More specifically, a recent survey showed these Nicholson features to be the reasons why leading plants are increasingly standardizing on Nicholson thermostatic traps:

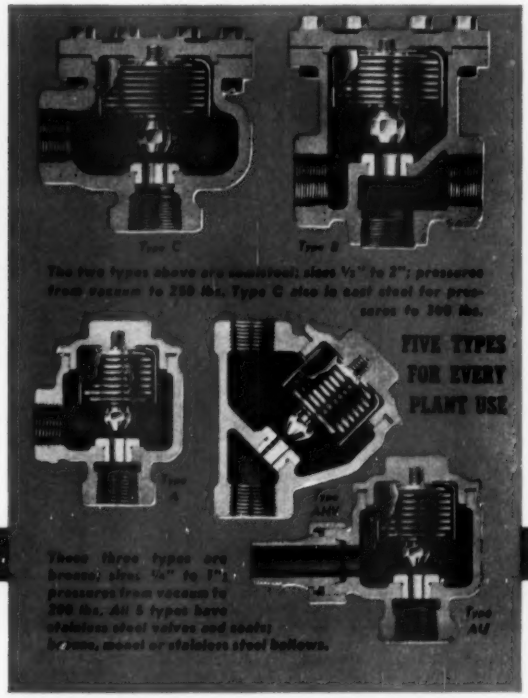
(1) Two to six times average drainage capacity. (2) Operate at lower temperature differential. (3) No air binding. (4) Freeze-proof. (5) Only one moving part. (6) No need to change valves for varying pressures. (7) Record low for steam waste. Types for every process, power and heat application.



Send for **CATALOG 751**

Contains installation diagrams and data for determining proper size of trap.

Nicholson traps on drying drums of asphalt saturator; Certain-teed's Dallas, Tex., plant.



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208 OREGON ST., WILKES-BARRE, PA.

Sales and Engineering Offices in 58 Principal Cities

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

operation to determine just when sulphation begins, and only by giving periodic equalizing charges and comparing individual cell specific gravity and voltage readings can it be detected in its early stages and corrected or prevented.

Permitting a battery to stand in a partially discharged condition allows the sulphate deposited on the plates to harden and the pores to close. Batteries should be charged as soon as practicable after discharge and not be allowed to stand in a completely discharged condition for more than 24 hr. It is also worth noting that high temperatures accelerate sulphation, particularly of an idle discharged battery.

If the level of the electrolyte is permitted to fall below the tops of the plates, the exposed surfaces will harden and become sulphated. If the acid is added to a cell in which sulphation exists, the condition will be aggravated.

In general, the higher the fully charged specific gravity of a cell, the more likely is sulphation to occur and the more difficult to reduce. If, in any battery, there exist cells of which the specific gravity is more than 0.015 above the average, the possibility of sulphation of these cells will be increased. *From a release for Gould-National Batteries, Inc., Trenton, N. J.*

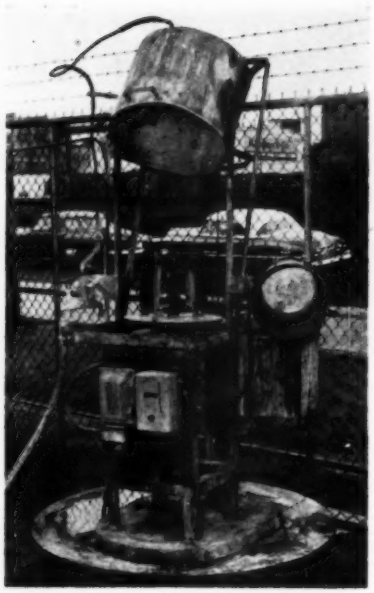
Editor's Note: *For sulphation remedies, please refer to Plant Engineers' Digest, page 32 of the April '52 issue of Plant Engineering.*

Washer Keeps Buckets Spick-and-Span

MOST SMALL CHAIN parts at the Diamond Chain Company, Inc. plant in Indianapolis, Indiana are transported between operations in buckets. The parts, being oily, accumulate dirt and particles of sawdust, some of which remain in the bottom of a bucket.

Anyone who has ever worked on an assembly machine knows how easily a few dirty parts can jam the machine; hence, there arose the problem of keeping the large number of buckets clean.

This was at first done by hand; a man dunked the buckets into a drum of furnace oil, then hosed them out with a jet of steam. This method was slow, it didn't get the buckets as clean as was desired, and it was an extremely unpleasant job for the man selected to do it.



This bucket washer was built by the men in Diamond Chain machine shop

The problem landed where many difficult problems land—in the Machine Repair Section of the machine shop. This section was asked to design and build some device that would clean buckets cleaner, faster, and yet cause no undue wear on the buckets.

The result was a bucket washer built almost entirely from scrap material. The bucket to be cleaned is placed upside down on a turntable; a cover is then lowered over the bucket. When it is lowered, the cover hits a switch on one side, and a valve on the other, causing the bucket to revolve against stationary wire brushes both inside and outside the bucket. At the same time, steam and a hot soap and water solution sprays the bucket. It is now possible to clean one bucket every minute, and to do it better than ever before. *From Chain Gang, published by Diamond Chain Company, Inc., Indianapolis, Ind.*

Quick Locking Coupling for Flexible Air Duct

This quick locking coupling for flexible tubing air duct connections was suggested by Clare R. Hillman. Formerly pins were used or a weld. From the Pontiac Warrior, Pontiac Div., General Motors Corporation, Pontiac, Michigan

Automatic Fire Snuffing

THE PUMPING STATION at the Kenova, Kentucky tank farm of the Ashland Oil & Refining Co. handles as many as 4,000 barrels of oil per hour. To overcome the type of fire that might start at the station, the company installed an automatically controlled foam system.

A sharp rise in temperature within the pump room starts the operation through a system of relays. Electric pumps force water into a pair of 60 gal tanks containing a protein-based powder.

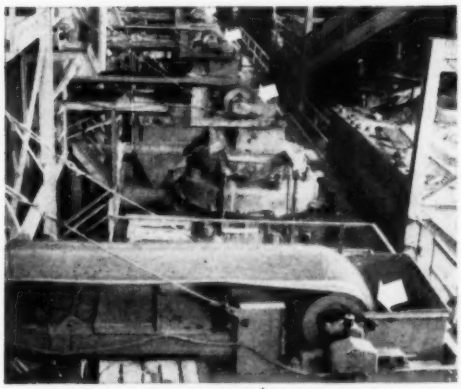
The powder, expanding 10 to 16

(Continued on page 42)

ADVANCED FERRO-PHOBIA

. . . Fer'ro-pho'bia, n. Fear of iron. It's enough to kill any cost-conscious preparation plant operator—fear of tramp iron damaging crushers and belts . . . costly repairs and downtime.

There's a sure cure . . . Dings Magnets. When ferro-phobia symptoms—unhappy people moaning about lost production—show up in your plant, phone your representative or write Dings. They'll prepare an effective magnetic Rx, backed by 50 years of experience, that will end the plague in a hurry.



WE ENDED THE PLAGUE IN DENVER
This big molybdenum preparation plant protects each one of its crushers with a powerful Dings Electro-Pulley—no ferro-phobia here.

Dings

DINGS MAGNETIC SEPARATOR COMPANY
4766 West Electric Avenue
Milwaukee 46, Wisconsin

DINGS MAGNETIC SEPARATOR COMPANY
4766 West Electric Avenue
Milwaukee 46, Wisconsin

Please send me Catalog C-1205-B on Dings Perma-Plate Magnets and Catalog C-5000-B with data on the complete Dings line.

Name_____ Title_____

Firm_____

Address_____

PP453

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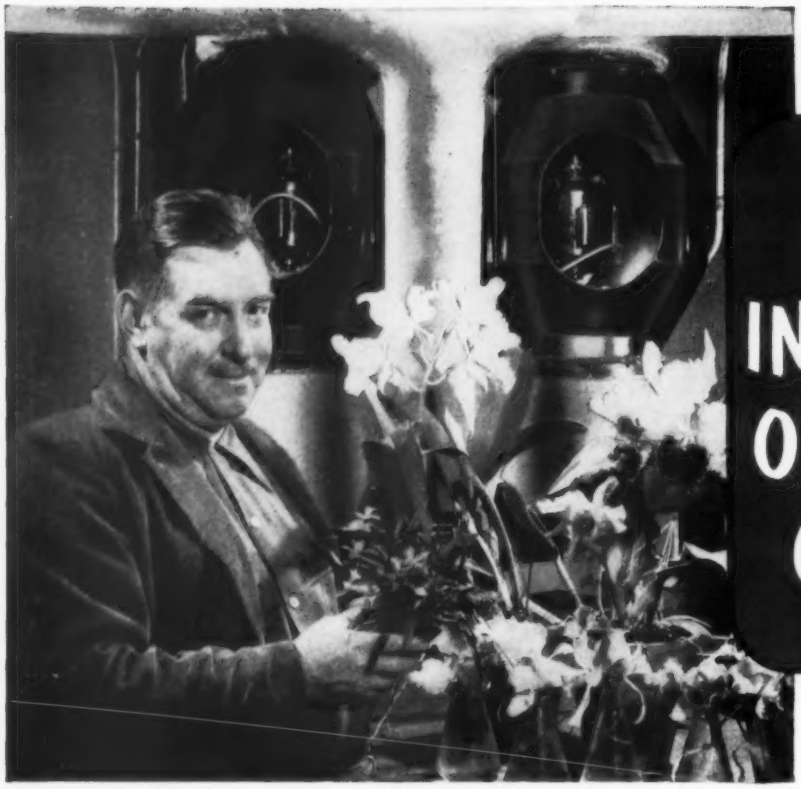


LIFE INSURANCE ON 10,000 ORCHIDS

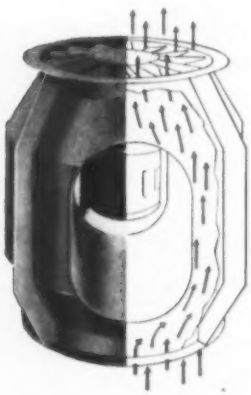
Orchid grower Walton Riffe, owner of Walton's Greenhouse, Dayton, Ohio, with some of his rare specimens. The two DeBothezat Induced Draft Bifurcator Fans in the background are mounted in the boiler breeching. Each fan serves two boilers.

A sudden drop in temperature can put an orchid grower out of business overnight. That's why Walton Riffe installed an automatic heating plant, complete with stand-by boilers, in his greenhouses.

To be sure of adequate boiler draft at all times, this famous grower mounted two DeBothezat Induced Draft Bifurcator Fans in the breeching. Now, Mr. Riffe doesn't worry. Dependable DeBothezat Induced Draft Bifurcator Fans produce a positive controlled draft that helps his system to maintain tropical temperatures regardless of weather.

Remember DeBothezat Induced Draft Bifurcator Fans the next time you have a stack problem. These fans provide a constant, controlled draft for boilers and furnaces at all times. They permit boilers to operate at maximum efficiency under any load, regardless of weather. And the cost of an Induced Draft Bifurcator Fan is usually only a fraction of the cost of erecting an old-fashioned brick or steel stack.

Ask your DeBothezat representative — you'll find him listed in the phone book under "Ventilating Equipment" — or write our factory, Dept. CE-853, for illustrated catalog PE-953.



HOW BIFURCATOR WORKS

The Induced Draft Bifurcator is a motor driven axial-flow fan in a divided housing. Motor is in an isolated chamber around which flue gases are by-passed (bifurcated) so that the motor always remains cool, clean and accessible. Induced Draft Bifurcators are built in twenty-four sizes, for high pressure boilers delivering up to 60,000 pounds of steam per hour and for low pressure boilers rated up to 190,000 EDR.

DeBothezat Fans

Division of American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

For more facts circle 527 on Reply Card

BULLETINS just released and of immediate plant interest

MECHANICAL POWER TRANSMISSION

101 **Mechanical Seals** — Bulletin 153-100000 is a 16-pp booklet providing practical, basic information on mechanical seals. Covers their development, function, types, application and maintenance. Much of the material is presented pictorially, with explanatory text accompanying the photos and drawings. Byron Jackson Co.

102 **Packaged Drive**—Booklet B-5808, 16 pp, on packaged adjustable-voltage drives, describes their construction, operation, typical applications, and economies of operation. Special operational characteristics that can be added to the standard package are described, such as inching, reversing, dynamic braking and multi-motor control. Case histories of adjustable-voltage drives in the machine tool, textile, and continuous processing industries are cited. Westinghouse Electric Corp.

103 **Stock Chains, Sprockets**—Sixteen-pp Catalog 753 describes, pictures and lists "from stock" roller chains of various pitch sizes, finished bore sprockets with keyways and setscrews in over 75 tooth sizes and more than 280 bores, and medium and large sprockets having taper lock bushings to provide off-the-shelf service with any required bore. The tabular matter covers speed ratios for various sprocket combinations. Diamond Chain Co., Inc.

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Plans called for installation on the second floor of a powerhouse. This demanded vibration-free operation. Having had several years' experience with two Clark 1500 hp, CBA-4 Balanced/Opposed Compressors, plant engineers repeated their original selection—*two more Clark units.* They had already *demonstrated* their vibration-free performance and extremely low maintenance—the direct results of Clark Balanced/Opposed design and precision construction.

For today's expansion and modernization programs, there is a growing preference for Clark Balanced/Opposed, Motor-Driven Air Compressors — industries' *most modern* compressors. Your nearest Clark representative will furnish complete information, or write for Bulletin 118.

CLARK BROS. CO. • OLEAN, N. Y.
Division of Dresser Operations, Inc.
Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON

CLARK balanced/opposed compressors

© 1953, Clark Bros. Co., Division of Dresser Operations, Inc.

For more facts circle 528 on Reply Card

• Plant engineers of Borden Mills, Kingsport, Tenn., have added additional safety to 189 of their spinning frames in this way. They have found MICRO switches ideal because they are sealed against the effects of lint-laden atmosphere, are ruggedly housed and have sufficient overtravel to withstand the banging of heavy doors.

Such plugging of danger sources—both for operators and machines—with MICRO switches is common practice among plant engineers and maintenance men. They find in MICRO switches the most efficient and economical way to make equipment not only safer, but more automatic, more productive.

There's a MICRO authorized distributor near you with a wide variety of switches to meet specific needs. Look in your classified telephone directory under "Switches, Electric."

MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

MAKERS OF PRECISION SWITCHES

FREEPORT, ILLINOIS

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

Foam nozzles are seen in action during actual test. Note material building up on tarpaulins which protect equipment

times its original volume, on contact with water, forms a heavy foam which flows through pipes and pours onto the spots to be protected.

In making a system test, Virgil Lawson, of the engineering department, went to the top of a stepladder and applied a rag soaked in hot water to the sensitive plate which actuates a series of relays to put the mechanism into action.

He had little more than gotten outside with the ladder when the flow began, indicating a satisfactory, quick response. From then on, the smothering material piled up rapidly, covering floor, motors and pumps, while on the outside the manifold was subjected to a similar deluge.

Even though the system is designed for a 15 min flow, it was shut off in less than eight minutes. Observing the deep deposit of foam after that time, the safety supervisor commented favorably on the test performance. *From Ashland Oil Log, published by the Ashland Oil & Refining Co., Ashland, Ky.*

Jib Crane Speeds Concrete Work

MANY SMALL BUSINESSES, especially one man operations, find that moving heavy or bulky objects is a real time consumer. When C. E. Sheets of Clemmons, N. C. had to shoulder the problem, he came up with a device which lifts and carries his concrete pipe perfectly. It can do the same for anything from motor blocks to marble slabs with equal ease.

Sheets erected a 25 foot jib crane which could swing horizontally through three quarters of a circle. He mounted a one-ton trolley type electric hoist to travel along the boom. To protect his motor from

American Blower

Unit Heaters

It takes only a few minutes to learn how much better your heating can be with American Blower Unit Heaters.

And, for years after you install them, you'll get the benefits of their lower fuel costs, lower maintenance costs and exceptionally long life.

Heavy-duty coils, unobstructed outlets for maximum heat diffusion, completely enclosed moving parts are but a few of the quality features which make these units outstanding. They carry Certified Ratings — and are sound-rated, too.

For data, phone the nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

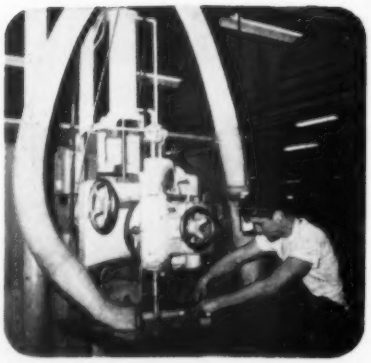
AMERICAN BLOWER

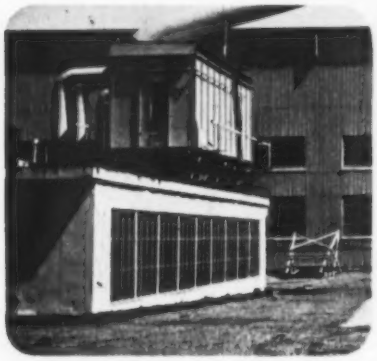
YOUR BEST BUY IN AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

For more facts circle 530 on Reply Card

BOEING saves $5400 annually





with DUSTUBE® dust control system

saves valuable warm air

improves working conditions

Heated air, exhausted along with sawdust and fine metal particles from the wood and pattern shops at Boeing Aircraft Co., was formerly a complete loss. Although much of the dust was removed from this air, it was not sufficiently cleaned by the cyclone collectors so the air could be returned to the plant. A Dustube Collector was installed that "launders" the air so thoroughly the heated air can be recirculated.

It is estimated that this installation will effect a reduction of approximately $5400 annually in the cost of steam heat. The savings in cold weather are expected to be approximately 2400 pounds of steam per hour . . . enough to heat 24 average size homes.

Uniform recoveries approaching 100% of the dust or fume entering the Dustube cloth type collector are commonplace. In spite of this unique efficiency, Dustube Collectors have an unusually low operating and maintenance cost. User after user reports: "The Dustube is certainly the least expensive of all dry type collectors to operate and maintain."

The latest developments in dust and fume control are described periodically in "Dust and Fume Topics." We will be happy to add your name to our mailing list.

American WHEELABRATOR & EQUIPMENT CORP.

dustube COLLECTORS

839 S. Byrkit St., Mishawaka, Ind.

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

Jib crane nicely handles the heavy job of filling pipe molds with freshly mixed concrete for this small manufacturer

the weather, he put a fabricated hood, built like the roof of a chicken brooder, over it.

Now he can hoist and carry from any point in a 1500 sq ft area, guiding the load with one hand and working the push button controlled hoist with the other. He moves his 500 pound finished product from "production department" to "storage department" as easily as he can walk from one to the other. *From a release for Yale & Towne Manufacturing Co., Philadelphia, Pa.*

Hi-Speed Brazing

A SMALL PIECE of silver solder, a paper-thin copper shim, a tiny particle of Tricon flux, that is the complete list of materials needed to braze a carbide tip to the steel shank of a cutting tool at the Cutter Salvage Corp. of Cleveland, O.

Induction heater is shown being used to braze a carbide tip to the tool shank

COOLITE GLASS makes daylight go a LONG WAY!

Coolite glass affords clean, attractive design in plant of John Baumgarth & Co., Printer, Melrose Park, Illinois. Architect: John S. Cromelin; General Contractor: Clearing Industrial District; Glazier: Hamilton Glass Company.

Printing Craftsmen Find it Easier to Make Good Impressions in Plant Glazed with 12,000 Sq. Ft. of Heat Absorbing Glass

Good printing depends upon a close coordination of hand and eye and Coolite, Heat Absorbing Glass by Mississippi floods the entire work area of this modern plant with copious quantities of conditioned, natural light at low cost. Coolite diffuses light in depth... throws it deep into work areas... eliminates sharp contrasts... reduces eye fatigue... cuts costly mistakes.

Translucent, light diffusing figured and wired glass by Mississippi for better daylight illumination is available in a wide variety of patterns and surface finishes, all scientifically designed—"visioneered"—to distribute light to best advantage. Specify glass by Mississippi.

There is no Substitute for **GLASS!**

It is non-combustible . . . won't burn. It is rigid . . . doesn't sag or warp. It has a permanently hard, impervious surface, not affected by time, abrasion or exposure to the elements. It won't corrode or stain. It resists chemicals. It is easily installed, maintained and cleaned by conventional methods.

Send for free Coolite catalog. "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

MISSISSIPPI *Glass* COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

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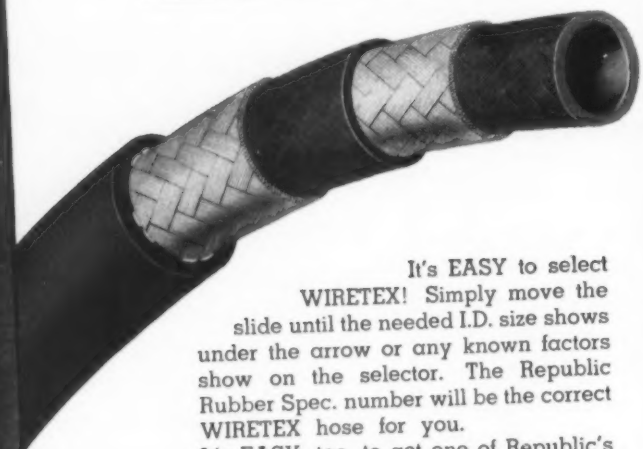
Republic
WIRETEX

Rubber Covered
Hydraulic Hose
selector

SIZE I.D.

REPUBLIC RUBBER SPEC.	WIRE BRAIDS	HOSE O.D.	MAX. W.P.	MIN. BURST	APPROX. WT./100'	BEND RADIUS
5/16"						
W-18-31	2	3/4"	4500	18,000	37	5"



It's EASY to select WIRETEX! Simply move the slide until the needed I.D. size shows under the arrow or any known factors show on the selector. The Republic Rubber Spec. number will be the correct WIRETEX hose for you.
It's EASY, too, to get one of Republic's new WIRETEX Selectors. This handy little slide fits right in your pocket (or desk drawer) and will unfailingly select the right Republic WIRETEX Spec. to fit any known factor.
SEND FOR YOURS TODAY! Write to:

"Quality Hose Builders for over 50 Years"

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

Yet the firm's production of cutter tools was obviously slowing down at the brazing table. It did not take long to find out why.

Heating tip and shank to brazing temperature, (1200 F), was taking five minutes, sometimes longer. The company's flame-type heat source simply could not keep up with the work.

There were other troubles too. Heat from the torch varied, was hard to regulate. Fringe heat from the brazing area was making things uncomfortable for other workers in the 50-man shop. Combustion products added to the chores.

A short time ago, a 7½ kw induction heater and cooling unit were installed in the company's shop. As a result, brazing which formerly took five minutes or more is now done in 30 seconds. The bottleneck has been smashed, and brazing cost per piece has dropped substantially. *From Electrical Production, published by Electrical League of Cleveland, Cleveland, Ohio.*

Gages Catch Machine Overload

ELECTRIC RESISTANCE wire strain gage devices are finding increasing applications in the field of instrumentation for automatic control, recording, and indicating the conditions of operations of machines and industrial processes.

In the manufacture of polyvinyl chloride resin powders Load-Beams are used to protect the mechanisms of centrifuges that separate the white flour-like powders from a water slurry in the final stages of production. These centrifuges are in the Pottstown, Pa., plant of Firestone Tire & Rubber Company where Exon vinyl resins are manufactured.

The torque required to operate each centrifugal separator is transmitted to a shear pin in a sleeve mounted on a pinion shaft and extending horizontally from the driving gear unit on the end of the centrifuge. The shear pin is kept from turning by a holder from which a rod extends down through a clevis where it is retained by a clevis pin. The clevis is attached to the end of the SR-4 Load-Beam, which is supported by a bracket extending out from the base of the centrifuge so that the beam can be positioned for different sensitivities.

As the rod is deflected by the force of the torque developed in the gear unit, strain gages are subjected to compression on one side of the beam and to tension on the other side, thus changing their electrical resistance. This is transmitted electrically to a recorder-controller in

Now...set fastening studs wherever they're needed
MODEL 450 REMINGTON STUD DRIVER
Here's new economy . . . new speed in construction fastening! The Remington Stud Driver joins wood or steel sections to concrete or steel surfaces in seconds . . . easily sets as high as 5 studs a minute. Powerful 32 caliber charges drive studs arrow-straight. The tool's light weight—only 5½ pounds—simplifies handling wherever studs are needed.
New guards for specific uses now make the self-powered Remington Stud Driver more versatile than ever. These attachments take all the guesswork out of stud location . . . assure fast, accurate fastening for every job. Illustrated are just 4 of these special guards. For full information about the complete line and about the Remington Stud Driver, send the coupon below.
A complete line of guards for special applications
Guard for Structural Channel
Guard for Switch, Utility and Outlet Boxes
Guard for "Unistrut" Sections
Guard for Conduit Clips
Listed & Approved by Underwriters' Laboratories, Inc.
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Remington Arms Company, Inc.
939 Barnum Ave., Bridgeport 2, Connecticut
Please send me my free copies of the new booklets showing how I can cut my fastening costs.
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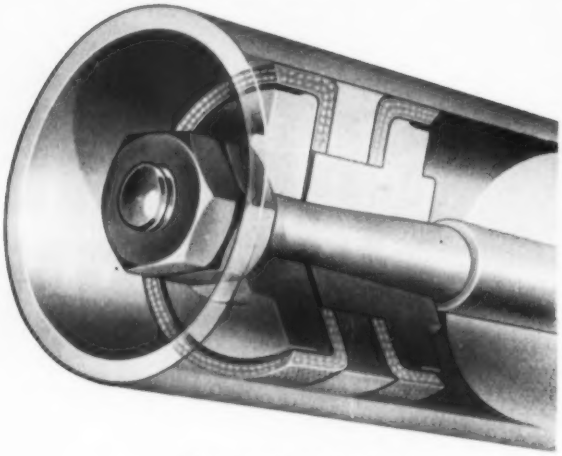
"If It's Remington—It's Right!"
Remington
DUPONT

For more facts circle 534 on Reply Card

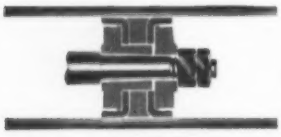
DARCOVA PUMCUPS

more efficient...job after job!

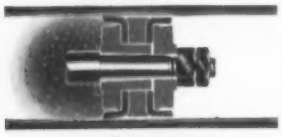


Phantom cutaway showing a typical Pumcup piston assembly.

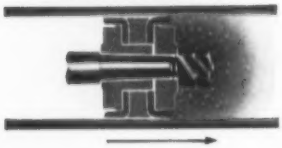
DIAGRAM OF DARCOVA PUMCUP ACTION (greatly exaggerated)



NORMAL: BOTH PUMCUPS RELAXED



UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE



NO matter how tough your pumping problem Darcova Pumcups can help solve it . . . this has been proved in thousands of plants year after year.

Darcova Pumcup Advantages

1. Texture engineering that not only increases volumetric efficiency, but keeps it high with no appreciable fluid slippage for the entire life of the Pumcups.

2. Darcova Composition Pumcups give many times the life of other types of piston packing . . . *at least 3 to 1!*

3. Standard or special compositions are available for exceptional stability in handling almost *any* fluid . . . strong acids, alkalies, food products and even troublesome petroleum derivatives.

Send For Free Bulletin—Ask for Bulletin No. 4401 on Pumcups for reciprocating pumps; Bulletin No. 4502 on Pumcups for air and hydraulic mechanisms. Address . . .

DARLING VALVE & MANUFACTURING CO.

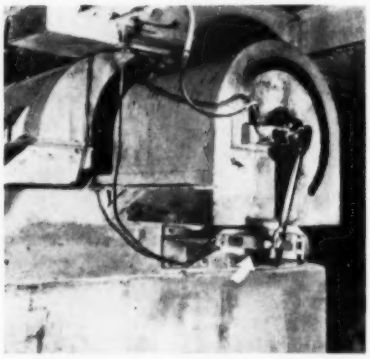
Williamsport 14, Pa.

DARCOVA® THE ORIGINAL COMPOSITION CUP PUMCUPS

For more facts circle 545 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)



Strain gages, load-beam and rod are mounted on end of gear unit of machine

which an electrical signal is converted and recorded in load units on a circular chart that shows the conditions under which the separator is operating at all times.

The centrifugal separator is protected in three ways against overloading. First, if the load exceeds a set value about 15% above normal load, a lamp is lighted on an indicator panel near the feed control valve. The operator then reduces the feed rate of the slurry. If the condition is temporary the recorder will show when the feed rate can be increased again.

Second, if the load increases too quickly for manual reduction of feed, a controlling electric circuit shuts off the drive motor of the separator.

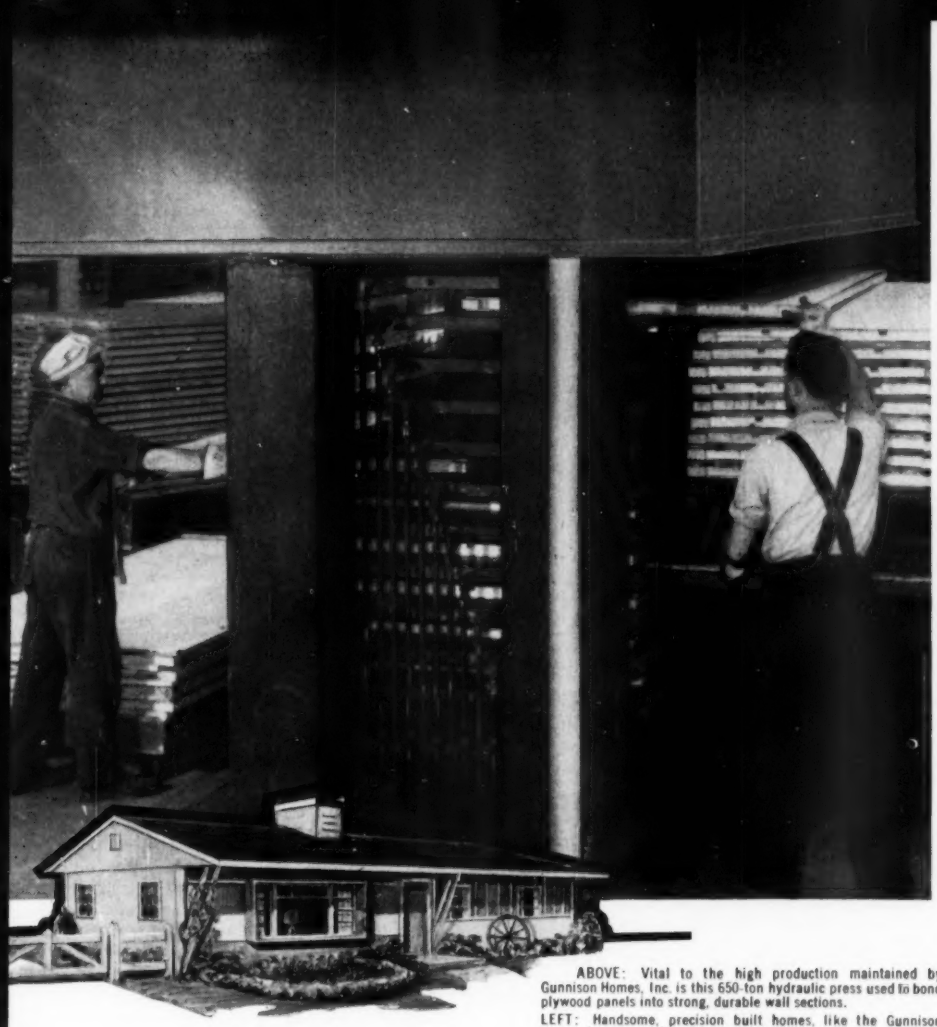
Third, if the load increases too suddenly and excessively, the shear pin breaks, allowing the rod to drop back in the retaining clevis enough to operate the associated limit switch to shut down the drive motor. *From a release for Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.*

Drilling for Footings

STAFF INGENUITY and an organizational ability to solve tough construction problems with a minimum of delay is enabling a Los Angeles contractor to save important time and money for a valued client.

Mac Isaac and Menke Company, general contractors, is building a $500,000 plant annex for Solar Aircraft in Vernon, California. The site of the new building was formerly owned by a rail transportation company that originally used the property as a source for sand. Subsequent re-filling of the land was done by dumping refuse of all kinds into the sand excavations.

In the first attempt to penetrate the layers of refuse and reach the sand bed below, a 24 in. drill rig was used. But large chunks of concrete,



ABOVE: Vital to the high production maintained by Gunnison Homes, Inc. is this 650-ton hydraulic press used to bond plywood panels into strong, durable wall sections.

LEFT: Handsome, precision built homes, like the Gunnison Coronado pictured here, are built in a matter of hours.

Answers a pressing need for Gunnison Homes, Inc. . . .

● Gunnison Homes, Inc., situated in New Albany, Indiana, is one of the leaders in the field of manufactured homes. Key to continuous production of precision built homes at the New Albany plant is the 650-ton hydraulic press, shown above, which was installed in 1947. This press processes ten plywood panels every cycle by the combination of heat and pressure . . . a tough job and one requiring reliable hydraulic performance to maintain production schedules.

STANOIL Industrial Oil was installed in the press when it was put into operation six years ago. STANOIL has stood the test of severe operation . . . with no evidence of oil deterioration being found during a recent inspection of the hydraulic system. Operation has been efficient. Minimum make-up oil has been needed to maintain the oil capacity of 450 gallons.

STANOIL
TRADE MARK
Industrial Oil

Find how STANOIL can benefit you by discussing this multi-purpose oil with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

What's YOUR problem?

Ralph E. Murnahan, of Standard Oil's Evansville office, is the lubrication specialist who keeps in constant contact with Gunnison Homes to make certain that there is no interruption of operation due to lubrication difficulties.

He is one of many lubrication specialists who make their headquarters in Standard's offices throughout the Midwest. These men have been specially trained in Standard's Lubrication Engineering Schools and, in addition, have a wealth of on-the-job experience.

To obtain the service of the lubrication specialist in your area, you need only call your local Standard Oil office. The lubrication specialist will discuss your lubrication problems with you . . . at no obligation to you, of course. He has a complete line of petroleum products to offer you, including:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

For more facts circle 536 on Reply Card

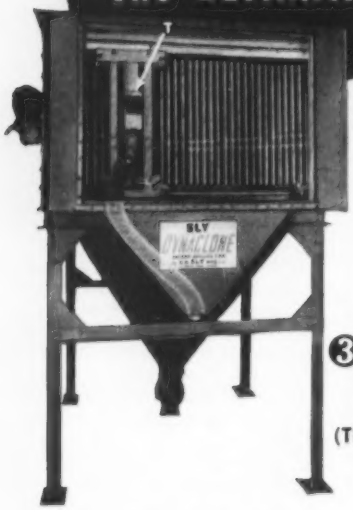
NOW!

THE

DYNACLONE®

PATENTED

The ULTIMATE in Dust Filters



1 CONSTANT SUCTION
AT DUST SOURCES

2 SELF CLEANING
FOR CONTINUOUS OPERATION

3 NO AUXILIARY MOTORS OR BLOWERS
(THE MAIN OPERATING FAN DOES THE CLEANING)

4 NO ABRASION OF BAGS BY THE CLEANER

The traveler (T) is open to atmosphere by means of a 4-inch flexible hose. As the traveler contacts the open end of each bag, the negative pressure which exists in the dust chamber draws a blast of air (from the atmosphere) through the bag to thoroughly clean it.

Each bag is cleaned, on an average, once every five minutes, thereby assuring uniform suction at dust sources.

The Dynaclone has now been in operation in many different industries for the past three years. More than half of present orders are from the same customers.

SEND FOR BULLETIN . . .

NO. 102

THE W. W. SLY MFG. COMPANY
4600 TRAIN AVENUE • CLEVELAND 2, OHIO
New York • Chicago • Philadelphia • Syracuse •
Detroit • Buffalo • Cincinnati • St. Louis •
Minneapolis • Birmingham • Los Angeles • Toronto

SLY PIONEERS & LEADERS in INDUSTRIAL DUST CONTROL

For more facts circle 537 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

metal, etc., were encountered and these rendered the drilling equipment ineffective.

Next a crane was brought into the job and an attempt was made to reach natural soil by excavating to a depth of 30 ft. But because the refuse crumbled easily the size of the excavation became too large to make this method practical. Then a 30 in. drill was brought in and it proved to be effective in making penetrations down to 35 ft.

When very large pieces were encountered it was found that a 30 in. steel ring or casing could be used to shore up the walls of the hole, enabling a man to go down with an air hammer and break up the material.

The soil was found to be so loose in some areas that cave-ins in several holes have developed at various levels. In these cases a sandy clay soil, imported for the purpose, is being tamped into the holes and employed as a binding arch to hold the fills in position until the drilling is completed and the concrete pour is made.

A total of 67 penetrations are being made and the contractors have set up an interesting schedule of closely coordinated operations which is getting the job done at surprisingly low cost. *From a release for Mac Isaac and Menke Co., Los Angeles, Calif.*

Dam Construction Material Cooling by Refrigeration

THE DETROIT DAM is a multi-purpose, gravity concrete structure at North Santiam River and is part of the Willamette Basin flood control project in western Oregon. This dam is 413 ft high and required 1,350,000 cu yd of concrete.

It is well known that the heat of hydration of cement causes thermal expansion in large masses of concrete which, at some later date, must cool with attendant shrinkage and sometimes destructive cracking. This may weaken the stability of the structure or shorten its useful life.

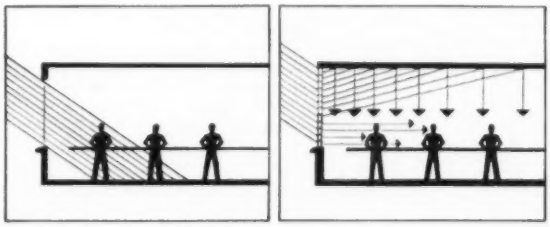
To provide against this, it was found desirable to limit the cement factor to .6 bbl per cu yd and to require material to be cooled to such an extent that the temperature of the mixed concrete when delivered to the forms would not exceed 50 F.

In addition, to requiring low temperature concrete, mechanical cooling of the concrete in the deep foundation recesses was also provided. This was accomplished by

Window maintenance problems are virtually ended once Insulux is in—no painting, no rust or rot, no shades, no harmful glare—just plenty of free, natural, comfortable daylight.

Daylight is free . . . use more of it through Daylight Engineering

The problem of daylighting industrial areas can be solved by the selection of the proper Insulux Fenestration System. No longer is it necessary to paint out or shade glass areas in your plant to control glare. Light control through Daylight Engineering with Insulux light-directing glass block makes it possible to use the *entire* glass area for the transmission of light.



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads part of the daylight to the ceiling—diffuses the balance, keeps brightness at comfortable levels.

New Insulux Glass Blocks Numbers 363 and 365 reduce the necessity for careful orientation of glass areas because they control light so efficiently that they virtually *"turn your building with the sun."*

Over and above daylight control other advantages in the use of Insulux Glass Block are:

(1) They are permanent; they do not rust or rot.
(2) They have a high insulation value.
(3) They are immediately available.

Daylight is free—Don't abuse it—Use it. Ask for the service of a Daylight Engineer to help you solve your daylighting problems. He'll be glad to give you more information or assist you in adapting Insulux Fenestration to your specific needs. Write: Insulux Glass Block Division, Kimble Glass Company, Dept. PE9, Box 1035, Toledo 1, Ohio.

KIMBLE GLASS COMPANY

Toledo 1, Ohio—*Subsidiary of Owens-Illinois Glass Company*

For more facts circle 538 on Reply Card

*Trade Mark. Patent No. 2463199.
DUALOC means dual lock. Two steel collars securely swaged around the ending double your security. Don't distort rope. Give full rope strength. Warranted by ACCO.

• Now you can buy ACCO *Registered* standard stock parts from which you can make infinite combinations of wire rope slings. If a new lifting job develops, you most likely can handle it with a different hook-up of the same standard ACCO *Registered* parts you use for regular lifts. But if you should need longer legs, or heavier legs, that's no problem either because everything you need is . . .

Stocked by Distributors

• ACCO *Registered* Wire Rope Slings and Fittings are stocked by ACCO Sling distributors. That means you can get quick service if you need additional parts, or if some part should become damaged. In case of damage, you don't send a "special" sling back for repairs. (You know how long that takes.) You just order a replacement part from your distributor who delivers promptly.

ACCO offers you a complete line of links, safety shackles, and hooks. These items are all *Registered* and *Warranted* to have the same strength and dependability as the slings they are to be used with.

Find Out Now *what you can do with ACCO Registered Wire Rope Slings. See your ACCO Sling distributor or write our Wilkes-Barre, Pa., office for literature.*

ACCO
In Canada: Dominion Chain Co., Ltd. Niagara Falls, Ontario
WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE
TRADE MARK
Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO Registered Wire Rope Slings

For more facts circle 539 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

circulating cooled water through pipes placed on the top of each 5-ft lift. In this way the normal base of the dam rests on a uniform foundation of even temperature and fixed volume. The method could be applied to any other type of work where temperature control of concrete is desired.

Aggregate was cooled by inundation in water circulated at 35 F. The water was circulated until a rock temperature of 38 F was reached. The circulation was then stopped, tanks were drained and the aggregate removed and passed over vibrating screens.

Sand was introduced into a jacketed hollow flight screw heat exchanger where its temperature was reduced by direct contact with the surface of the screw conveyor. Water at 35 F was circulated through the hollow screws and outside jacket to keep the sand from coming in contact with the cooled water.

Sand was fed from the bins into the coolers where it was conveyed in a horizontal direction by the screw conveyors to the end of the chamber where it dropped vertically into a lower chamber where the same process was repeated. After passing through the fourth level the sand was deposited on a 24-in. belt conveyor where it was taken to the mixing plant.

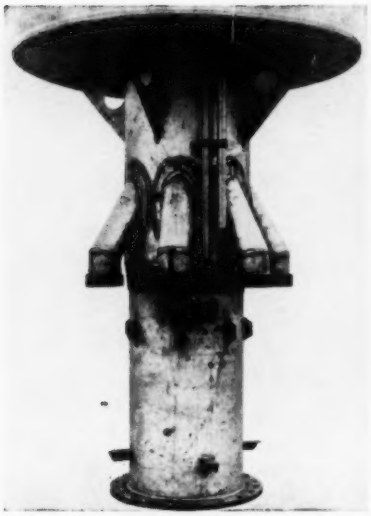
Conventional ammonia compressors, shell and tube condensers, and shell and tube evaporators of standard manufacture comprised the refrigerating plant of 700 tons capacity for cooling the water used in the various processes of the cooling plant. *From an article by Roy C. Clark and W. R. Johnson in the Military Engineer, published by the Society of American Military Engineers, Washington, D.C.*

Tip is Tops for Savings

BURNING above petroleum refineries, flare stack fires release unavoidable emergency gases without polluting the atmosphere. But they can eat up two to four metal flare tips a year.

At Standard Oil of Ohio's No. 1 plant in Cleveland, steeplejack charges for renewing the stack tips ran up to $2,200 per change. Various alloys were tried, but six months was the longest any could survive this exposure to corrosive waste gases, sulfurous soot deposits, steam injections, weather and temperature conditions.

To solve this problem, the company's engineers designed a new stack tip. Because of air inspirator



The branches projecting from the stack section are inspirator tubes which help make this tip design a money saver

tubes in the stack tip, flames would shoot upward regardless of the winds and eddies. The metal for the tip was to be heat- and corrosion-resistant, and refractory material was to be used for the inside lining.

Thirty months passed and the Inconel stack tip was outlasting the previous design by five to six times. Total savings in labor charges alone were estimated at $11,000.

Several petroleum equipment suppliers are now licensed to make these patented tips for others with the same problem. *From Nicklesworth, published by the International Nickel Company, Inc., New York.*

Repairs by Bronze Surfacing

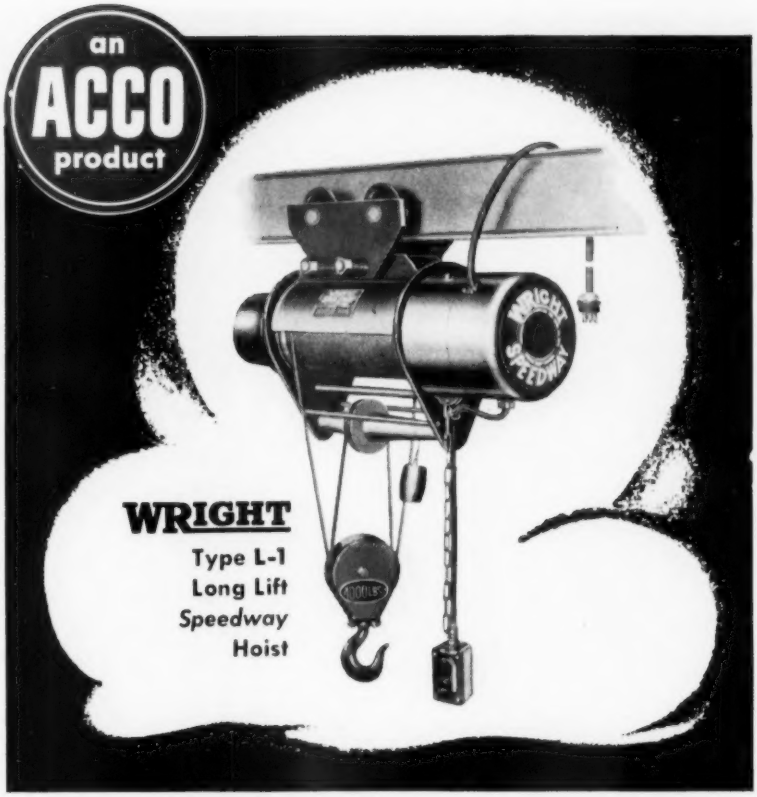
BRONZE SURFACING is a fast way to repair worn parts. Around the shop there are many metal parts that are subject to wear. Some of them are gear teeth; the struck ends of chisels; and the sliding surfaces of machinery, pumps, and engine parts.

When wear-resisting bronze welding rod is applied to the worn surface, and the surface is finished to its original size, the part is ready to go back to work. The same equipment is used as for bronze-welding —a welding blowpipe, bronze welding rod, and bronze welding flux.

The following are some points on bronze surfacing: 1. Clean the weld areas thoroughly. Remove all oil, grease and rust. 2. Heat the part only to a dull red. If the part is too cool, the molten bronze will form balls and won't spread. 3. Use a good flux and use it often to get the part chemically clean. 4. Each time you add a layer of weld metal be sure to melt the previous layer.

Before doing actual jobs, it is a good idea to practice on different types of metals. *From Linde Tips, published by Linde Air Products Company, Div. of UCC, New York.*

an ACCO product



WRIGHT
Type L-1
Long Lift
Speedway
Hoist

You Can Lift 2 Tons 20 Feet with this WRIGHT Speedway Hoist

• If the ceiling is high and material must be moved over machinery and partitions, or if you want to lift from basement to second floor, here's a hoist that will do it.

The **L-1** WRIGHT *Speedway* has a lift of 20 feet and is reeved with a 4-part single line that wraps in a single layer on a grooved drum. In either of two speeds, lifting or lowering is smooth and stable, so it is fine for either intricate lifting jobs or production material handling.

Motors of the **L-1** WRIGHT *Speedway* have 30-minute ratings. In addition the **L-1** has the five key long life features of all **Frame 1** WRIGHT *Speedway* Hoists. These are: heat-treated and surface-hardened alloy steel gears, hard alloy silver electrical contacts in controller, heavy duty crane type safety limit stop, automatic multiple disc load brake, and ball bearing gear shafts. And there are others.

See your WRIGHT Hoist distributor today or write today to our York, Pa., office for DH-425

ACCO

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

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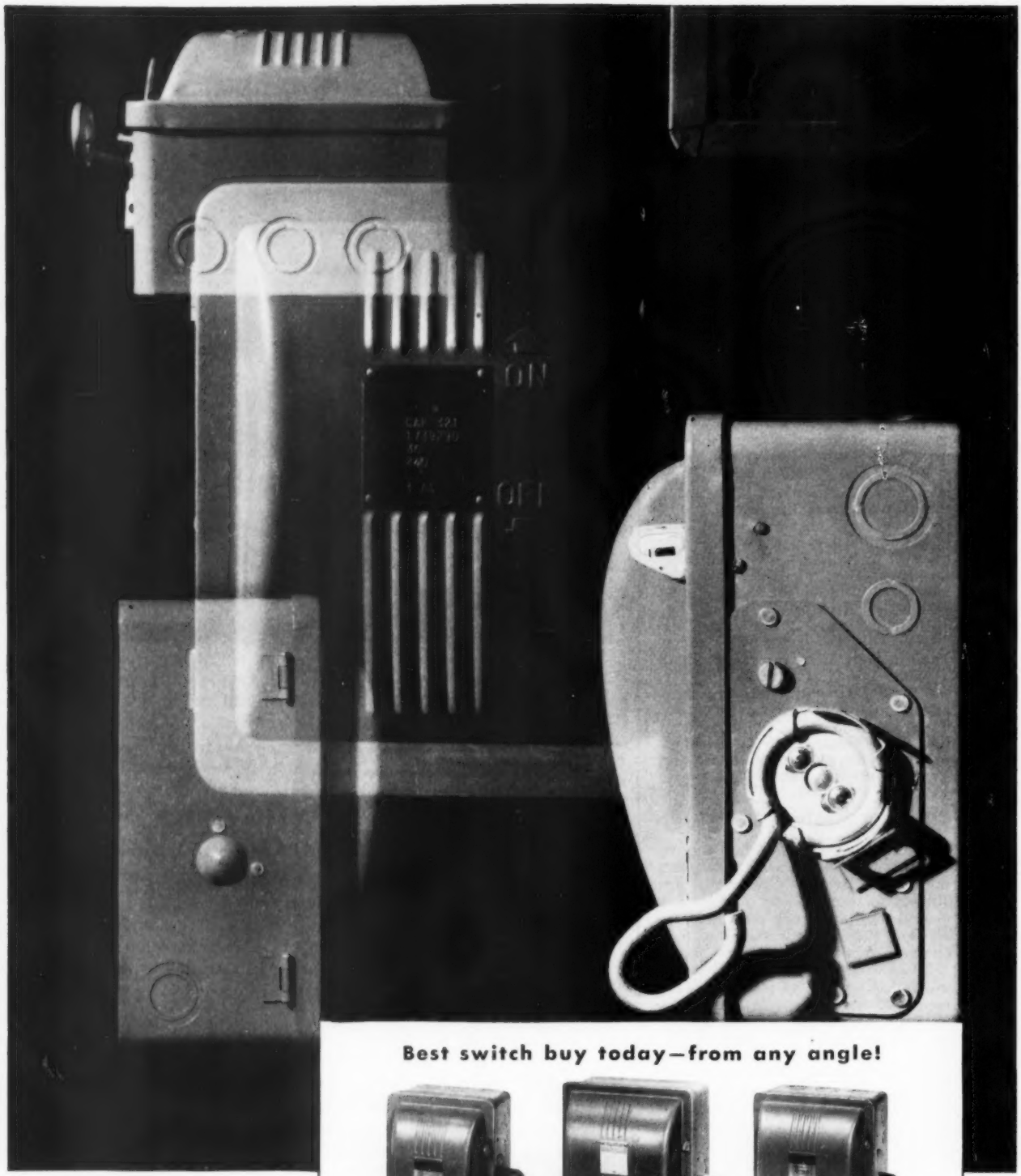
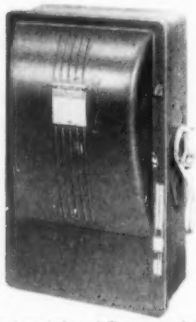
WRIGHT
Hoists
Trolleys
Cranes

For more facts circle 540 on Reply Card



Best switch buy today—from any angle!

Heavy Duty
Industrial Applications



Industrial and Commercial
Applications—Type CA

Light Duty,
General Purpose

New *Life-Line* CA Switch gives greatest value today!

Meets NEMA Type A specifications at Type C prices

Now, in ONE great new switch, you can get the toughness, safety and lifetime performance of Westinghouse Type A quality switches in the price range of conventional Type C switches. The new CA licks the problem of matching economical first cost to service versatility in a broad range of commercial and industrial applications.

The CA is designed with a quick-make, quick-break, spring-operated mechanism. New interlock prevents opening of cover while switch is in "on" position. Horsepower rated, these switches can be used on inductive circuits.

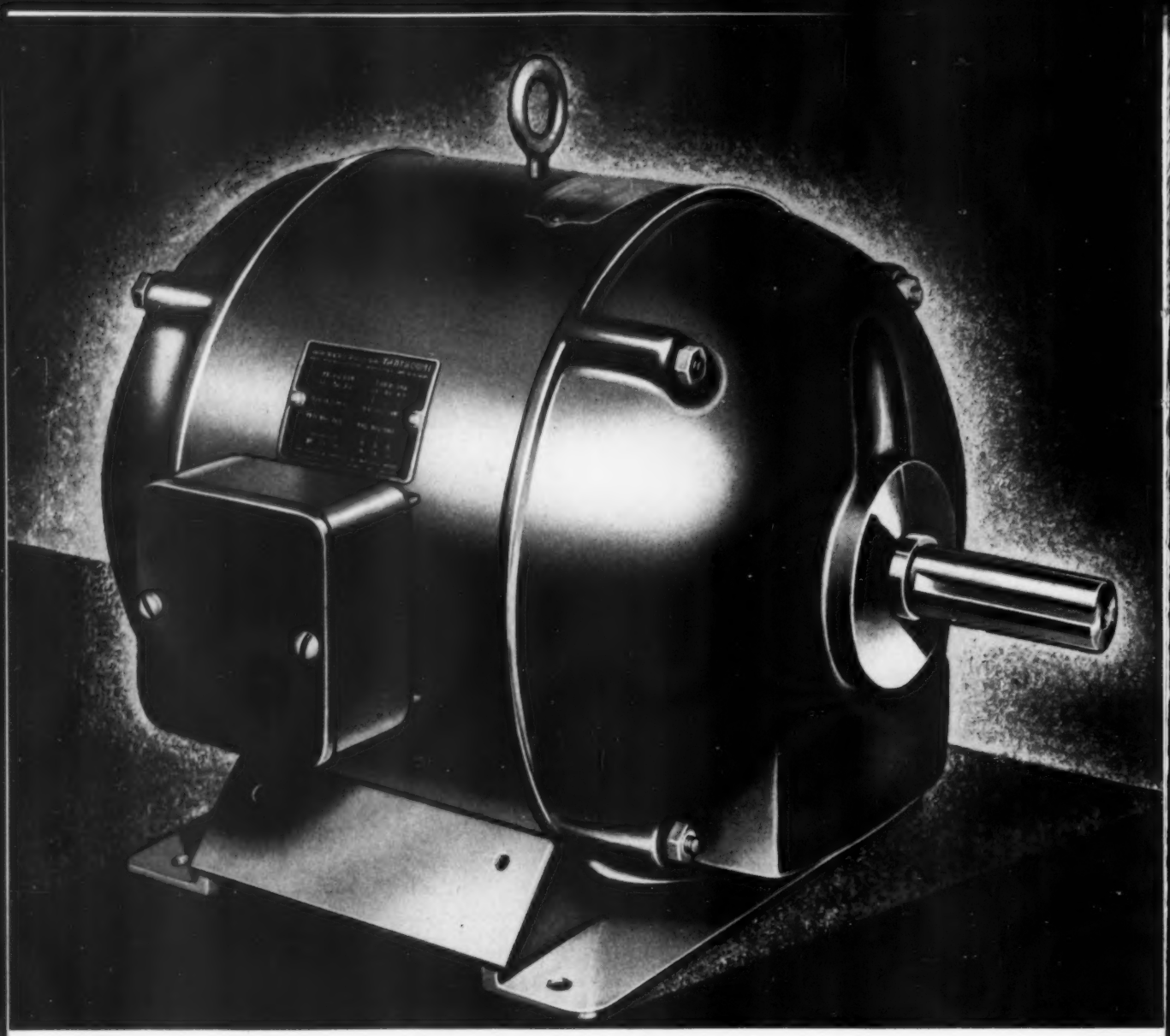
Your biggest plus in the new CA is the protection, long service and basic economy of all Westinghouse switches—in the exclusives that conventional Type A switches cannot touch. Exclusive diamond-pointed breakjaw keeps arcing outside contact area, eliminates burning and beading, prolongs contact life. Exclusive one-piece copper construction of contact jaws, hinge jaws and terminals reduces heat power losses. Nowhere else can you get these and many other switch lifesaver benefits. Stack dollars against safety switch performance anywhere and, mechanically and electrically, you'll find Westinghouse switches the greatest value in a decade.

For extra tough applications demanding sheer strength and stamina, get the Westinghouse heavy duty Type A Switch.

See your Westinghouse Distributor. Have him demonstrate his full line of Westinghouse A, CA and D switches for NEMA Type 1 applications. Delivery—immediate. Write for new Booklet B-4723, Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. J-30164

YOU CAN BE **SURE**...IF IT'S

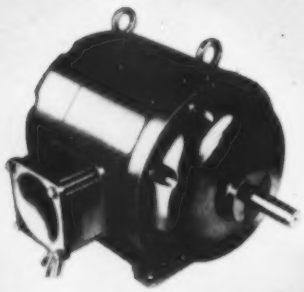
Westinghouse



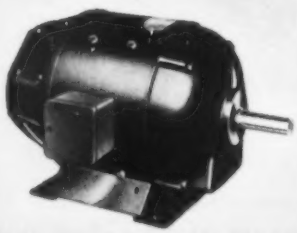
R & M "All-Weather" Polyphase Motors, 1 to 125 h.p.

A COMPLETE LINE - 1 to 125 HP.

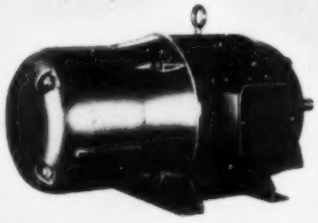
Explosion-Proof, Totally-Enclosed Fan-Cooled, and Chemical Plant Motors, 1 to 40 h.p.



Direct Current, 1 to 7½ h.p.



Capacitor Single Phase, 1 to 7½ h.p.



Frequency Converters, 2½ to 15 K.W.

Because you can forget about periodic maintenance— and throw away your grease gun—you'll find that

Big, sealed bearings on R&M motors save you trouble and money!

One of the quickest ways to buy a motor you can install —and *forget*—is to be particular about *bearings*. That's why the extra-large, extra-wide, factory-lubricated and sealed bearings in R & M "All-Weather"* Motors are so important.

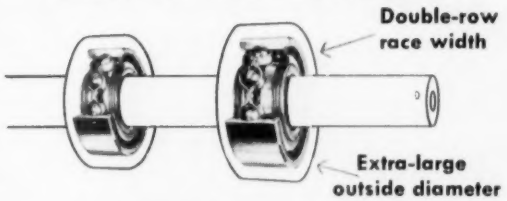
These bearings are much larger than you would normally expect to find. Being larger, they have more and larger balls—withstand more thrust.

And, because they're factory-lubricated and sealed, your grease gun becomes obsolete! That in itself eliminates a good many problems: the danger of introducing dirt and grit into the bearing, under-lubrication, and, equally harmful to motors, *over-lubrication*. Just an inspection once every 5 years or so...that's all that bearings in R & M "All-Weather" Motors need!

Bearings, of course, are only part of the story on the many outstanding features you'll find in R & M "All-Weather" Motors. A few others are shown below. Taken together, they mean *better* motor performance at *lower costs*. If that's the performance you want in your plant or product, use the coupon at right. *It will pay you to get complete information!*

*"*All-Weather*" is the trademark of Robbins & Myers, Inc.*

LOOK AT THE DIFFERENCE!



The usual motor bearing and an R & M bearing have been mounted on the same shaft . . . you can SEE the difference!

ROBBINS & MYERS, INC., MOTOR DIVISION PE-93
Springfield 99, Ohio

Please send me, without obligation, complete information on R&M "All-Weather" Motors—up to 125 HP.

*Name*_____ *Title*_____

*Company*_____

*Street*_____

*City and State*_____

*Product we manufacture:*_____

R & M MAKES THEM ALL!

Explosion-Proof; Totally Enclosed; Single Phase; Direct Current;

If it's an **R&M** *it's the Right Motor!*

Motor Generators; Frequency Converters; Chemical Plant Motors; Close-Coupled Pump Motors; Jet Pump Motors; Motor Parts.

ROBBINS & MYERS, INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Fractional & Integral h.p Motors & Generators

Electric Fans

Electric & Hand Hoists & Cranes

Moyno Pumps

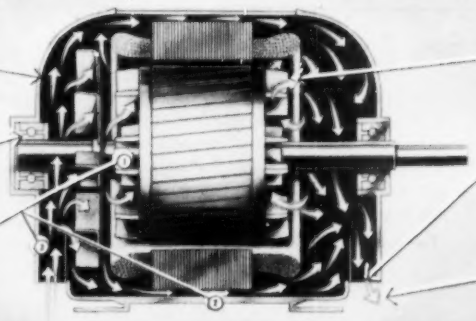
Propellair Industrial Ventilating Equipment

ALL THESE FEATURES...at a standard motor price!

Shielded against moisture and damage . . . by heavy, full-height shrouded end-heads.

Extra-large ball bearings . . . Sealed to keep grease in, dirt out.

Completely "Weatherized" . . . rust inhibitor protects rotor (1) against damage; steel parts (2) have baked-on undercoating; cast-iron parts (3) get anti-corrosion treatment. Terminal boxes are gasketed; lead-ins are sealed.



Insulated Coil Ends . . . R & M insulates all *coils*, as well as phase *groups*, for 3 to 4 times greater insulating value!

Sealed against rodents and debris—openings are screened.

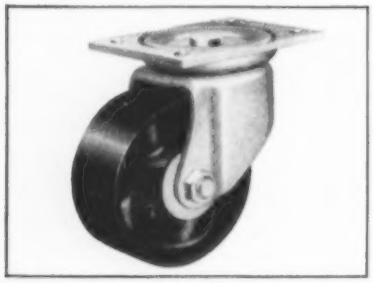
"Clean-Sweep" Ventilation—R & M Motors stay cool and stay clean; arrows show how high velocity air flow stops build-up of dust and dirt.

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

This pair of Bassick newcomers can cut your handling costs

New heavy-duty "Form-Forged" caster shoulders loads up to 1500 lbs.



S6992-2 "Form-Forged" Caster with 2½" tread wheels and load rating of 1500 lbs.

This new Bassick "Heavy-Duty" steel caster offers new highs in performance at a new low in cost. It harnesses the easy action of precision-formed raceways to a frame that's built extra strong to take the punishing loads of powered assembly-line dollies, and equipment. You can get it in 5", 6", 8" and 10" sizes, with semi-steel, forged steel or rubber-tread wheels. First cost is low, and its rugged construction enables it to stand up under the toughest operating conditions – which means lower maintenance costs. Take a look at these important features:

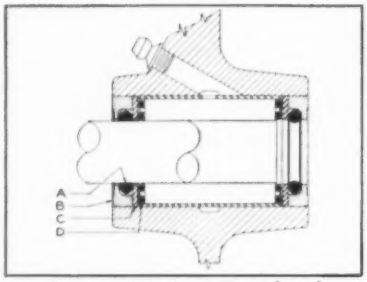
Double Ball Race – for efficient, easy motion

Extra-Heavy King Pin – for full protection at this critical point

Fully Hardened Raceways – for years of dependable service

Structurally Shaped of Heavy-Gauge Steel – for safe support of heavy loads

New low-cost sealed bearings for industrial rubber-tread wheels



Cross-section of new Bassick seal

This drawing of the new Bassick seal shows its simple design which assures low first cost plus long service life. Parts listed below form baffled path that lubricant has a hard time travelling. The wheel retains its lubricant and foreign matter is kept out.

The sealed bearing can be re-greased by standard methods through regular Alemite fittings. It's particularly effective in preventing entrance of dust, water spray and steam-cleaning fog. Now available on a growing number of Bassick wheels.

A. Neoprene "O" ring is in elastic contact with axle shaft . . . does not turn.

B. Powder metal outside seal washer is press-fitted in hub of wheel and turns with wheel.

C. Steel roller bearing retainer washer rotates with wheel.

D. Roller bearing end cage washer.

Find out more about these new Bassick products today

Check your industrial distributor salesman for facts and figures on these two new cost-cutting Bassick developments. Or write direct to us. Either way you'll receive a prompt reply to your inquiry. You'll also receive the full story on the new "Form-Forged" Steel Caster and the new Sealed Bearing Wheels—a story that will prove once more that when it comes to industrial casters and wheels . . . it pays to come to Bassick.

For more facts circle 544 on Reply Card

Monkey-Savers

We recently received a letter from a New Orleans monkey fancier. Turns out that Bassick casters have one use we never thought of – they help keep monkeys healthy. Here's how our New Orleans friend tells it:

"Your casters have been put to very good use. As you may know, monkeys are susceptible to all the diseases of humans, and in particular, colds and pneumonia. I have found it quite advantageous, with the use of Bassick casters, to roll the cage into a sheltered garage on cold, rainy days, and out into the yard again when the sun shines. They make one cage do the work of two. Also, they simplify cleaning the cage, as I simply roll it over to the drain and hose it out. Bassick casters are real Monkey-Savers."

Whether you're handling materials or monkeys, it seems, you'll save time and money by putting Bassick casters under them. Your Bassick industrial distributor will help you pick the right type. Or write us.

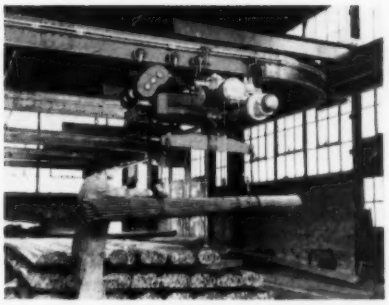
THE BASSICK COMPANY
Bridgeport 2, Conn.

In Canada:
Belleville, Ont.

Bassick A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE

MONORAIL Pays!

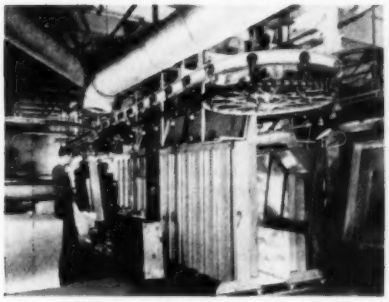


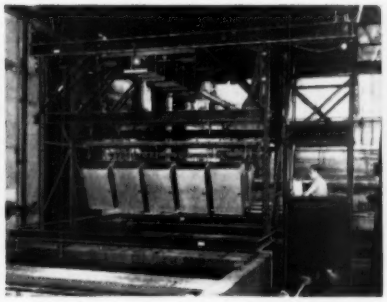
INCREASES TONNAGE

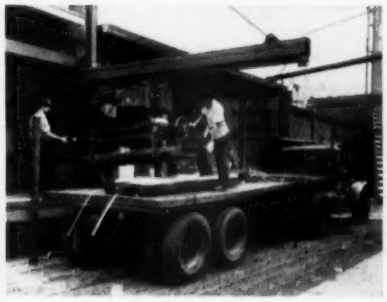
From 26 to 48 tons of steel rod per day was the increased movement produced by a properly engineered monorail system.

LOWERS COST

This simple system actually saved $150 in handling costs within four months of operation. No more sheet-by-sheet movement.







SAVES TIME

Passage, on monorail, of metal parts through infra-red dryer, cuts 70% from former drying time. All other handling in plant on monorail.

MORE CAPACITY

30% more capacity was added to metal cleaning process by handling a third more units on carrier with one man operation from cab control.

LESS LABOR

Operators claim to save 26 man hours per truck over former unloading time. Interlocking monorail cranes in the plant also reduce handling costs.

Write for Bulletin C-1
showing many more cases where MONORAIL PAYS!

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE **CLEVELAND 7, OHIO**

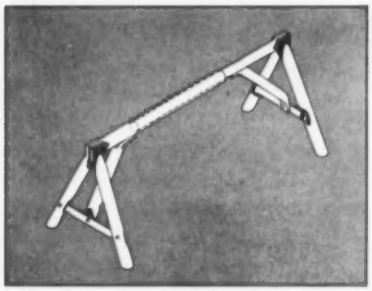
For more facts circle 545 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Horse Adjusts to Job

Contributed by C. H. Willey



Span of work horse is easily adjusted. Pipe construction, either riveted or welded, permits use of telescoping sizes

Jig Table for Crates

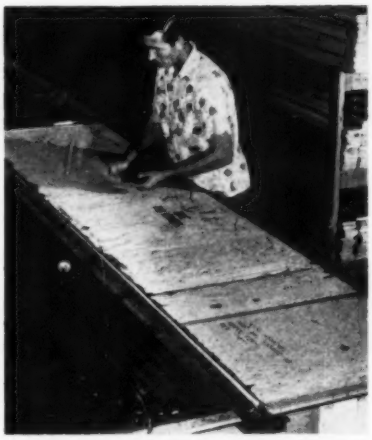
STANDING 3 ft high and surfaced with ¼-in. steel plate, a 30 x 5 ft table is a newly developed aid in making packing crates at the Temco Aircraft Corp., Dallas, Texas.

With built-in sliding bars and frame guides, the table forms and secures the variety of crate sizes required in this aircraft sub-assembly plant. Prior to the installation of the table, the 40 different crate sizes used required the building of 40 different jigs (2 x 4 lumber nailed to a wooden table top) to shape and secure crate ends during fabrication.

The table top is edged with wood and marked in linear dimensions. These markings, combined with the sliding bars on the table top, turn the top into a 30-ft carpenter's square. The square can be reduced to fit any dimension by sliding the bars that make it up. Three separate bars each extend 1/3 the length of the table, and move from front to rear. They move independently or may be joined to form a movable jig.

Two similar bars extend from front to rear and move the length of the table. All of the bars ride in slots or on rails and can be secured with thumb screws.

Every 2 ft along the table's length are twin rows of holes to admit guide pins. These pins secure the crate's framing pieces during fabrication.



Workman drives nails to fasten plywood siding to framing of crate side

The operators first adjust the slide bars to the intended dimensions. Framing, already cut to measure and placed in bins under the table, is laid in place on the top and secured by guide pins. Slide bar thumb screws are tightened and plywood, also pre-cut to measure, is placed inside and butted against the slide bars over the framing. Using table-edge reference marks, workmen drive nails through plywood into the framing. These nails are automatically bradded against the steel table top.

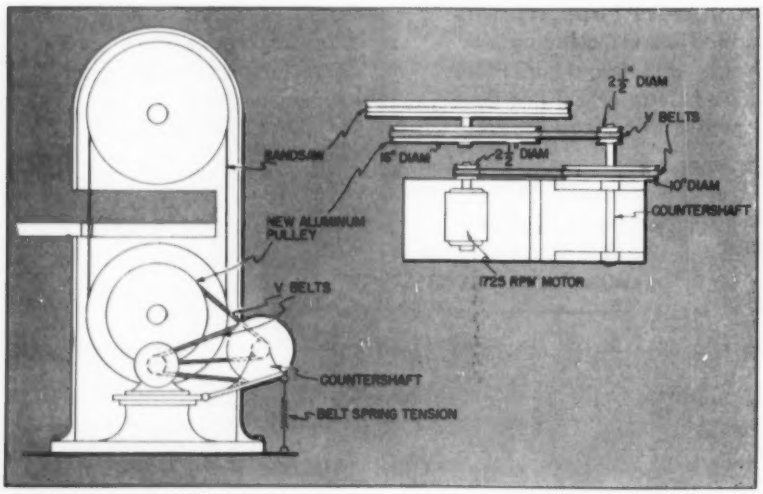
Two operators can set up, fabricate and remove for assembly a 30 x 5 ft crate side in 30 minutes. With no readjusting other than a move of the sliding bars, they can start work on a 42 x 30 x 24 in. crate, or they can divide the slide bars and fabricate assemblies for three or more different crates at the same table.

Converted Bandsaw Cuts Metal and Plastics

SAWING METAL, plastics and other hard materials on a wood-cutting band saw is common practice at one shop in the Mare Island Naval Shipyard, after modification of its bandsaw. Lack of equipment required that these hard materials be cut with a hack saw or sent out

The saw modification consisted of installing a countershaft and pulleys that reduce the speed of the saw from 3500 rpm to approximately 60 rpm, and installing a hardened, metal-cutting saw blade.

Turning at 1725 rpm, the motor is equipped with a 2½-in. pulley and belted to a 10½-in. pulley on a countershaft. Another 2½-in. pulley on the countershaft is connected to a 16-in. pulley on the saw. Driving through this arrangement, the motor turns the bandsaw at 60 rpm.



Elevation and plan show arrangement of countershaft and pulleys to slow speed

Cutting Drum Grinder Cover

SEVERAL TYPES of drum grinders that require spirally-wound coated abrasive drum covers are being used in industry for surface finishing flat wide sheets and strip stock. Replacement of drum covers are commonly cut from rolled stock and installed by plant maintenance men or by machine operators, and improper cutting of the cover can often lead to waste or malfunctioning of the machine. If the procedures outlined by W. T. Conway, of the Behr-Manning Corp., are followed, a minimum of coated abrasive stock will be wasted and the new covers will fit accurately.

A separate procedure is offered for each of the two basic types of

Why pay for Replacements Over and Over and Over?

GLAZE

WITH

PLEXIGLAS

It isn't the price of glazing material that makes window-replacement costly. The big item is labor and factory overhead, every time you have a broken pane replaced. When you pay for this over and over again in high-breakage areas, maintenance costs go up fast.

You can prevent frequent breakage and cut maintenance costs way down by glazing with PLEXIGLAS® acrylic plastic. This tough, light weight, *outdoor plastic* withstands the severe service conditions of industrial plants—impact, twisting, and vibration.

In addition, PLEXIGLAS:

- . . . increases safety of personnel.
- . . . eliminates need for expensive, hard-to-maintain, protective wire screens.
- . . . is available in transparent and translucent colors for the reduction of solar heat and direct sky glare.

We will be glad to send you the names of dealers in your vicinity.

PLEXIGLAS is an ACRYLIC PLASTIC. It should be installed and maintained as described in our brochure, "Window Glazing with PLEXIGLAS". Copies are available promptly on request.

Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada.*

PLEXIGLAS *is listed in Sweet's Plant Engineering File, Section 4a/Ro.*

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

OPERATION—PRODUCTION

(O and P begins on page 60)

spirally-wound machines in use. On one type, the abrasive cover is butt-wrapped on a smooth drum; on the second type, the abrasive cover is overlapped along the spiral. The drum on this second type has a spiral groove on its surface to allow for the overlap. On both types, the cover is clamped at the drum ends to keep it snug.

Practically all of these drum sanders are designed to use 24-in. wide rolls of abrasive. Because the diameters and lengths of the drums vary, the abrasive covers must be measured and cut to fit the individual machines.

Basic drum dimensions are length and diameter; basic cover dimensions are the length of the taper T and the length of the cover P, all of which should be in inches.

Butt-wrapped spiral covers

Calculate area of drum to be covered:

A = length L x diam D x 3.14

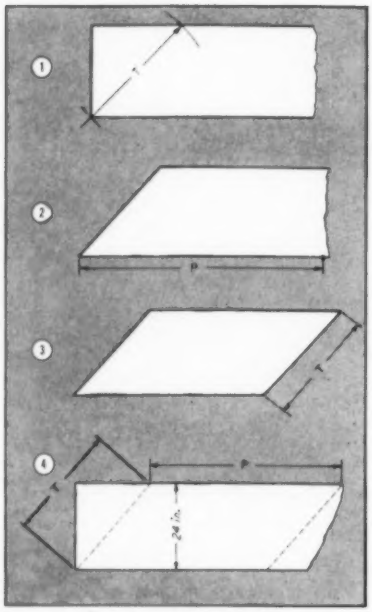
Calculate length of abrasive cover:

P = drum area / abrasive width

Calculate length of angle cut T:

T = drum diam D x 3.14

Knowing T, scribe an arc of radius T from one corner of the abrasive belt until it intersects the opposite edge, Fig. 1. Cut the abrasive on a line between the two points. Measure off the calculated length of P along the edge, Fig. 2. Rescribe the arc of radius T and cut the abrasive on the line parallel to the first cut, Fig. 3.



Drawing shows successive stages of measuring and cutting stock for covers

Overlapped Spiral Covers

Calculate theoretical drum circumference C and length of angle cut or taper T:

C = drum diam D x 3.14 + width of overlap measured parallel to edge of drum

T = C

Calculate drum area to be covered:

Area = length L x theor circ C

Calculate length of cover P:

P = drum area / abrasive width

Knowing T and P, proceed as in the example of the butt-wrapped cover.

After the initial cover has been cut from a roll of abrasive stock, subsequent replacements may be cut by merely measuring off distance P and cutting the stock parallel to the previous cut, Fig. 4.

Flexible Hose Helps Pump Bearings

AN OIL PUMP maintenance problem has been solved at the Wheatena Corp., Rahway, N. J., by installing flexible metal hose on the pump inlet and discharge lines.

The company's cereal roasting vats are oil-fired, and the fuel oil is pumped from ground level to the fourth floor where the vats are located. One oil pump serves each of two roasting rooms.

To offset the misalignment that resulted when solid pipe fittings were drawn up tight on the suction and discharge lines to the pump, Titeflex flexible metal hose was installed at both pump openings. The release of strain on the fittings

(Continued on page 64)

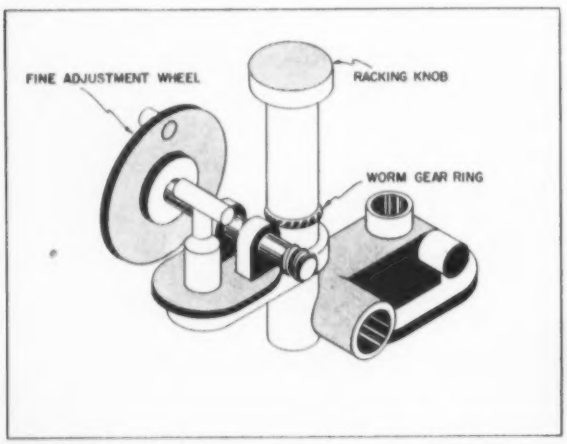
Fine Adjustment on Cutting Torch Arm Simplifies Tracing

AT THE Charleston Naval Shipyard, J. E. Livingston has suggested that a worm or spur gear be installed on the racking knob of gas cutting machines to increase the ratio on the knob.

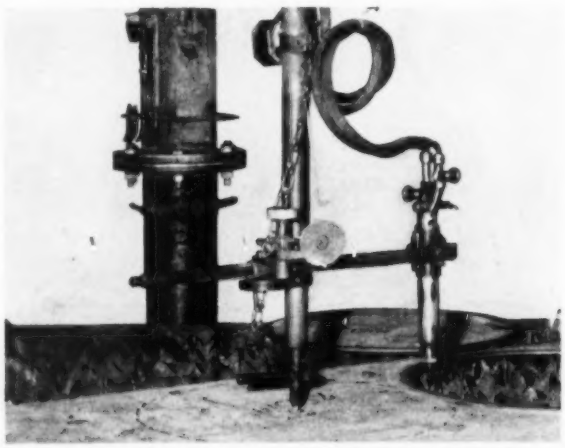
Using the worm and gear, the burner can move the cutting torch in and out to follow an irregular cut. Some cuts can be made with the added equipment that would be much more difficult without the addition.

The meshed gears on the standard machines are large, and under some conditions a slight turn of the knob provides more adjustment than is desired, either in or out. At times, the shaft binds, and it is impossible to make adjustments without stopping the machine or cutting a bad spot in the work by forcing the racking knob.

The method adopted provides a ratio on the racking knob that facilitates making a slight adjustment with no difficulty.

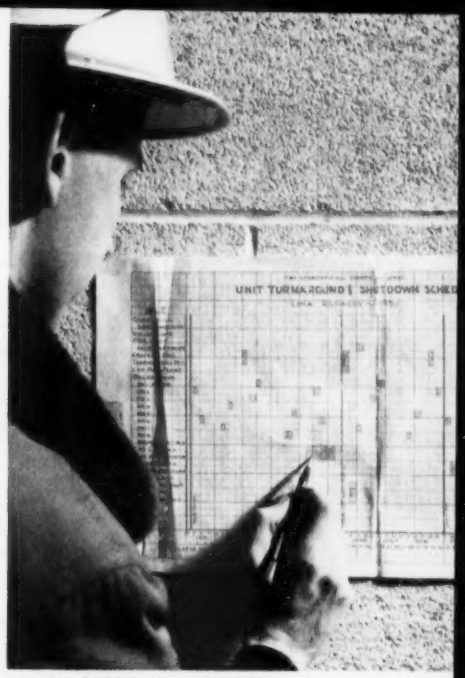


Drawing illustrates worm gear mounting on racking knob



Worm gear attachment for minor adjustments on burner

MAINTENANCE IS VITAL in Sohio's highly automatic cracking process that requires only six men per shift. New Lima, Ohio plant operates around the clock, runs 16,000 barrels per day.



YEARLY OVERHAUL SCHEDULES are posted in key areas so that plant operating and maintenance personnel can project their requirements ahead.

Productive maintenance helps keep refinery "on stream"

Planned equipment overhaul and routine maintenance boost output at Sohio plant

The big catalytic cracker at the Standard Oil Company (Ohio) installation in Lima, Ohio, operates around-the-clock, running 16,000 barrels of gas-oil every day. It's a highly automatic process—and to keep "on stream," the refinery has set up their maintenance program for a year ahead on this vital equipment.

One reason for this program's success is the equipment record system developed by the maintenance department. Every piece of equipment in the refinery is marked with a plant record number. Inspection and routine maintenance schedules for all equipment are set up monthly, quarterly, and annually. These schedules are then co-ordinated with a "unit turnaround and shutdown schedule" which shows planned overhaul periods for the coming year.

As a result of this careful planning, more output is delivered with available equipment and men, and the work flow has been smoothed out. Maintenance has been made *productive*.

Is management in your plant "Maintenance Minded"?

If they aren't, you need to convince them of the importance of *Productive* Maintenance. General Electric can help you with a kit of Productive Maintenance information. It shows how a planned, systematic maintenance program can get more output from your existing equipment . . . reduce machine downtime . . . lower production costs. Ask your G-E Apparatus Service Shop representative to tell you more about *Productive* Maintenance—today! General Electric Company, Schenectady 5, N. Y.

SPECIFIC EQUIPMENT OVERHAUL is scheduled by plant area in this master book. Equipment is keyed to central file (below) by equipment record numbers.

COMPLETE MAINTENANCE RECORDS for planned overhaul and routine maintenance as well as inspection are kept by record number in this central file.

NEW G-E KIT of maintenance information can help you win support for your maintenance ideas. It describes what *Productive* Maintenance is, how it works in typical plants, what it can do for you. Write to General Electric Co., Section 801-9, Schenectady, N. Y. Ask for GEZ-356.

Maintain Optimum Production with Productive Maintenance

GENERAL ELECTRIC

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this will STIMULATE you

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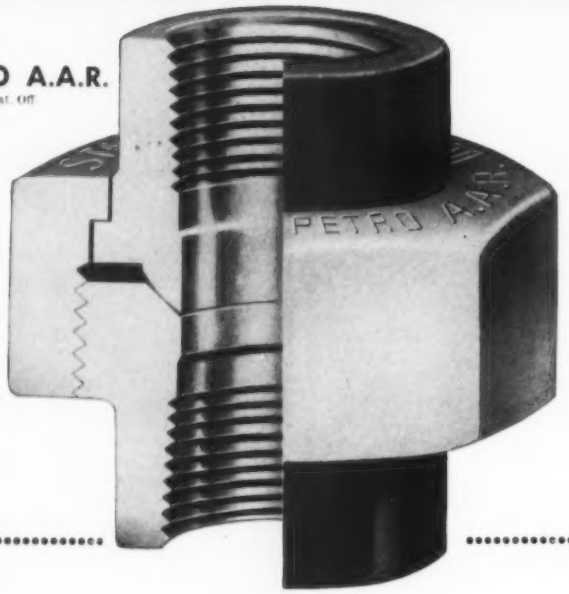
Reg. U.S. Pat. Off.



PETRO A. A. R. Forged Steel Unions are manufactured to strict A. A. R. standards and precision made from A. I. S. I. 1023 open hearth, silicon killed forging steel for temperatures from 100° below zero to 1000° above zero; pressures of 900 lbs. S.W.P. and 3000 lbs. C.W.P. at prices in line with conventional 300-lb. unions. PETRO is the most economical union for general industrial and oil refinery service. Specify PETRO A. A. R. for economy and perfect satisfaction.

HYDRO A. A. R. Forged Steel Unions are the only forged steel unions with two bronze seats completely fused to steel and conforming to A. A. R. dimensional standards. Seats are machined and cold rolled. Nut threads are permanently lubricated with Udylite Cadmium. 600 lbs. S.W.P., 2000 lbs. C.W.P.

Sizes ¼" to 3"

For additional information about these and other Forged Steel Unions write Department P, for illustrated Catalog or refer to listings in Composite Catalog pages 3194-3195, Refinery Catalog page 695, and Chemical Engineering Catalog pages 1291-1295.

ORDER BY TRADE NAME FROM YOUR LOCAL JOBBER

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

CLAYTON MARK & COMPANY

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OPERATION—PRODUCTION

(O and P begins on page 60)

Flexible metal hose sections in suction, discharge lines ease strain on bearings

benefitted the pump bearings to the extent that the bearings have not required packing in five years, as compared to the twice-yearly packing they received prior to the Titeflex installation.

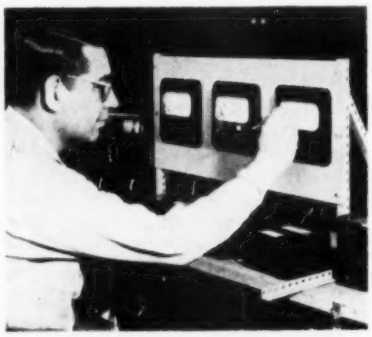
Panel for Marking Meters

Contributed by George Ordaneff
Allis-Chalmers Manufacturing Co.

SPECIALLY-SCALED ammeters are often required for applications where the proper scale range is not available. Scaling and checking of these meters is done in the Allis-Chalmers electrical test section.

To avoid inaccuracies which might result from magnetic fields (or even stray air currents) on an open meter movement, the practice has been to remove and replace the meter cover after each test reading. With 50 or more calibration points to check on each meter, this became a tedious operation.

A special mounting has been devised, on which three meters can be installed for calibration. The mounting includes a panel stamped out to accommodate the meters, and



Meter is held in mounting panel as scale reading is marked in calibration

Right for the job and priced right!

There's nothing sensationally "tricky" about this pipe hanger. It's just the most practical and inexpensive way of hanging pipe for a great many jobs. Complete assembly includes a split pipe ring and socket, rod, extension piece and universal I-beam clamp. Available for pipe from ½" to 8", for loads from 75 to 1510 lbs.

It is well worth remembering that a good piping job is too important to jeopardize with improvised or inadequate pipe hangers and supports. You can get from Grinnell just the right pipe hanger for any job within the shortest possible time at the lowest cost consistent with quality.

Grinnell has the most complete line of pipe hangers, extensive manufacturing facilities, warehouses across the country, and jobbers in almost every city and town.

UNIVERSAL SIDE I-BEAM MALLEABLE IRON CLAMP (Fig. 225) . . . Used on American Standard I-beams as well as wide flange beam sections. One of 14 different Grinnell beam clamps to meet varying specifications.

MALLEABLE IRON EXTENSION PIECE (Fig. 157) . . . Bolts into Universal Side I-beam Clamp (Fig. 225) and other malleable iron clamps to receive hanger rod. Provides for adjustment of rod.

MALLEABLE IRON SPLIT PIPE RING AND SOCKET (Fig. 107R) . . . Once hanger rod is turned to proper adjustment and the attached half of the ring is snugged against the pipe, the other half of the ring is swung up into position and bolted. For 13 pipe sizes, ½" to 8", for loads from 75 to 1510 lbs.

GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

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. . . THEN WE INSTALLED ALGRIP

And Ended Slipping Accidents And High Insurance Costs!

It happened at a large industrial plant, where oil and grease on a loading platform created a constant hazard. A lift truck skidded on the slippery surface, toppled from the platform's edge, and crushed the operator to death.

ELIMINATED: Accidents like this—which cost a man his life.

SAVED: $20,000 in Additional Compensation Premiums.

Then A.W. ALGRIP Abrasive Rolled Steel Floor Plate was installed on the platform—and slipping accidents ended at once. For ALGRIP is truly non-slip—even on steep inclines! Hundreds of tiny abrasive particles in each square foot of ALGRIP converted the slippery, dangerous platform into a hard gripping, anti-skid surface—safe for men and vehicles alike.

IMMEDIATE SAVINGS were obtained in three ways: (*1*) *No more costly, morale shattering accidents.* (*2*) *Faster handling of loads.* (*3*) *Workmen's compensation insurance premiums were substantially reduced by more than enough to pay for the* ALGRIP *installation.*

END SLIPPING ACCIDENTS THAT STEAL PRODUCTION AND KITE INSURANCE RATES

A.W. ALGRIP—only abrasive rolled steel floor plate in the world—pays for itself in savings from safety. Tough abrasive particles (same kind used in grinding wheels) put hundreds of tiny safety-brakes in every footstep—make it virtually impossible to slip even on steep inclines. ALGRIP doesn't wear smooth either—wear only exposes new particles. And tough rolled steel makes this floor plate stronger than other abrasive floorings. For safety at a saving, get the full ALGRIP story today. Write for our new Booklet AL-7—without obligation.

Over 125 Years of Iron and Steel Making Experience.

ALGRIP Abrasive Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

Other Products: A. W. SUPER-DIAMOND Floor Plate • Plates • Sheet • Strip (Alloy and Special Grades)

For more facts circle 550 on Reply Card

OPERATION—PRODUCTION

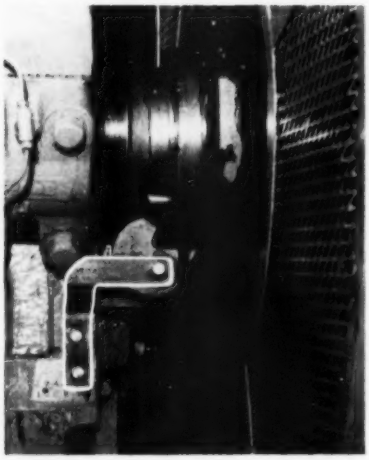
(O and P begins on page 60)

is provided with three permanently mounted meter covers on the front of the panel. A slot in the glass of each meter cover exposes the scale of the meter for marking.

Safety Retainer for Press Latch Dog

Contributed by John Burpee and James Sullivan

FABRICATED from steel plate, a right-angle safety retainer is providing added safety for punch press operators in Eastman's Kodak Park works. On the punch presses, a latch dog is positioned to engage with a



Safety retainer (outlined) holds latch dog in place in event of stud loosening

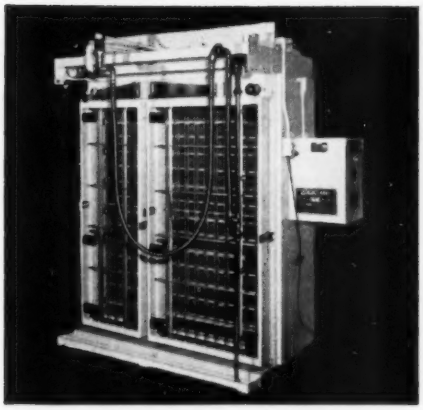
lug on the clutch, to prevent accidental recycling of the press. Failure of this lug to perform its function, should its supporting stud become dislodged, would allow repeated operation of the press, with considerable danger to the operator.

Mounted over the stud holding the latch dog, the safety retainer adds an additional measure of safety, in event the stud should work loose.

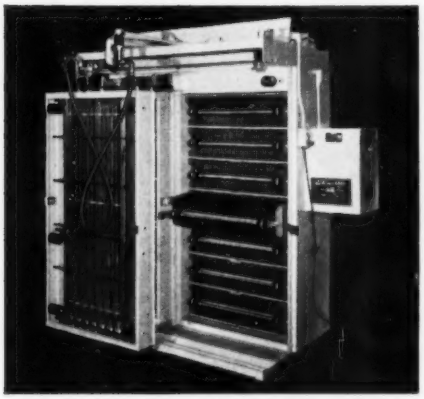
Special Lubricator Cools Bearings

WITH BEARINGS rolling into paint-baking ovens at 300 F and into tempering ovens at 600 F, the Simmons Co., Elizabeth, N.J. was experiencing considerable trouble with their lubrication. The lubricant on the wheels of the overhead oven conveyor trolleys burned off or decomposed, leaving no protection for the bearings.

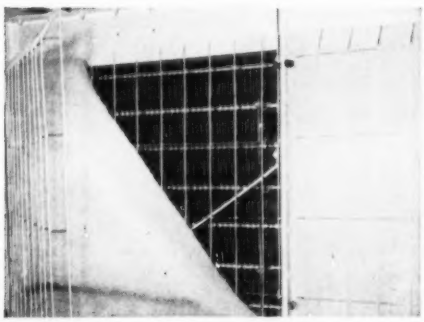
Four bed springs hang from each trolley, as the trolleys go through the oil burn-off and spring tempering furnace, are dipped in paint,



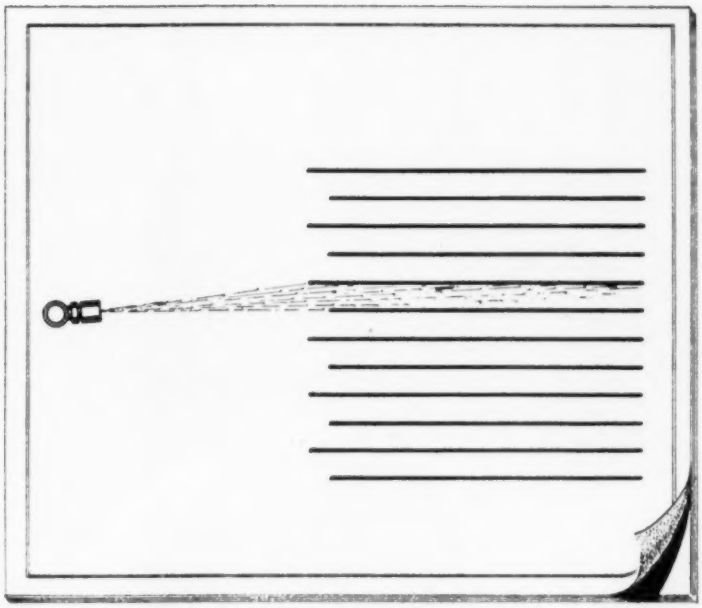
The above illustration shows the hinged ionizer section closed with the new Type "H" Washer in normal position when precipitator is operating. A push-button switch, located on the right-hand side of the above illustration, operates the washer and opens the solenoid valve that controls the water supply. The header makes a complete trip across the face of the precipitator and returns, automatically, to the starting position where it contacts a limit switch that breaks the electrical circuit.



In the above illustration the ionizer section has been opened to show that the washer does not interfere in any way with access to the collector assembly. As in the standard Electro-Cell, the plates are completely removable for thorough cleaning or inspection whenever necessary without the use of any tools or accessories whatsoever.



This illustration shows that the water eliminator frame has been opened to show density of the AMER-*glas* blanket and the ease with which the pad may be removed from the precipitator. If the precipitator is properly maintained and energized electrically at all times during fan operation, the afterfilter will require a minimum amount of attention. Because it is made of fine hair-like glass filaments, the pad is easy and pleasant to handle.



here's the reason for the 5° lead on the traveling spray nozzles on the

ELECTRO-CELL TYPE "H" WASHER

The new type "H" Washer is incorporated as an integral part of the ELECTRO-CELL precipitator and provides "push-button" control of the cleaning operation—thus greatly reducing maintenance and increasing the efficiency of the famous ELECTRO-CELL.

The outstanding feature of the new Type "H" Washer is the rotation of the header at each end of the travel to advance the spray nozzles approximately 5° from the vertical. Result—the best possible penetration of the spray water, assuring thorough coverage of the entire depth of the collector plates with the resulting maximum cleaning action and a minimum of water!

The Type "H" Washer is another "first" from AAF and offers better cleaning efficiency and water economy advantages over the standard fixed-nozzle method of "flooding".

Write the American Air Filter Company for technical data and descriptive information on this latest AAF achievement. And remember—AAF experience will help you solve all your air cleaning problems.

expect the best from ..... AAF

American Air Filter

COMPANY, INC.

228 Central Avenue, Louisville 8, Ky.

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If you want "Thru-the-Air" handling at its low-cost best, you can't beat this — a *genuine* P&H Zip-Lift Electric Hoist with rope control . . . only $199.50.

This new "Zip" is built to give you years of trouble-free service — *guaranteed* to withstand an occasional overload up to 25% more than the rated capacity. Other important advantages include real wire rope hoisting for wider side pull, double brakes for double safety, and easy installation (just hang it up and plug it in).

Yes, here's the number-one buy in the low-cost hoist field — the new Zip-Lift ready to save time and money for you. Check the many ways "Thru-the-Air" handling can cut your *costs*. Ask your nearby P&H Dealer to give your plant the once-over. His advice will cost you nothing — and he will save you money. Call him today!

Also available with full-magnetic push button control

handle it "THRU THE AIR" with

P&H ZIP-LIFT

P&H

ELECTRIC HOIST DIVISION

HARNISCHFEGER CORPORATION

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TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

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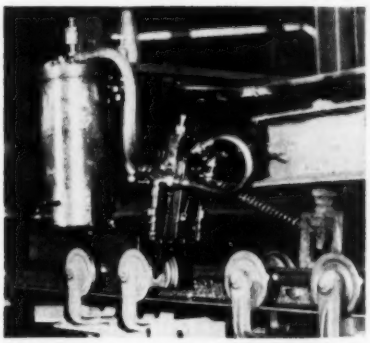
(O and P begins on page 60)



Lubricant spray head in spraying position as trolley wheels trigger air valve

and then sent back to the oven for 15 minutes' exposure at 300 F.

Using a suspension of Oildag, colloidal graphite made by Acheson Colloids Co., in Esso Mentor 28, lubrication is provided by spraying each trolley wheel as it passes the lubrication point. The trolley wheels trip a lever that operates poppet valves and positions twin spray nozzles to lubricate the blind bearings. The lubricant enters the bearings through holes drilled into the bearing retainers for this purpose.

Made from a section of 6-in. pipe, the lubricant reservoir is mounted directly over the tramrail. Compressed air is piped to it to supply pressure for the spray heads. A walking beam mounting permits the spray head assembly to ride with the wheels while spray is in operation.

Dry Ice Localizes Heat

A METHOD of soldering brass fittings on rubber-filled and rubber-wrapped flexible piping has been suggested at the Mare Island Naval Shipyard.

Specified for freon refrigeration and air conditioning systems, the piping is built up from flexible tubing by filling the ridges with liquid rubber cement, to about ¾ in. from the end. After a double wrap of fabric-backed rubber tape, the piping is sheathed with flexible copper sheathing and the necessary brass fittings are soldered on the ends.

To prevent damage to the rubber cement and the rubber tape, a cone of dry ice is secured around the tube prior to the soldering to keep the tubing as cool as possible.

After installing, the copper sheathing is trimmed to the same length as the piping, and flux is applied to the ends. The sheathed flexible pipe is then inserted into the fluxed brass

(Continued on page 70)

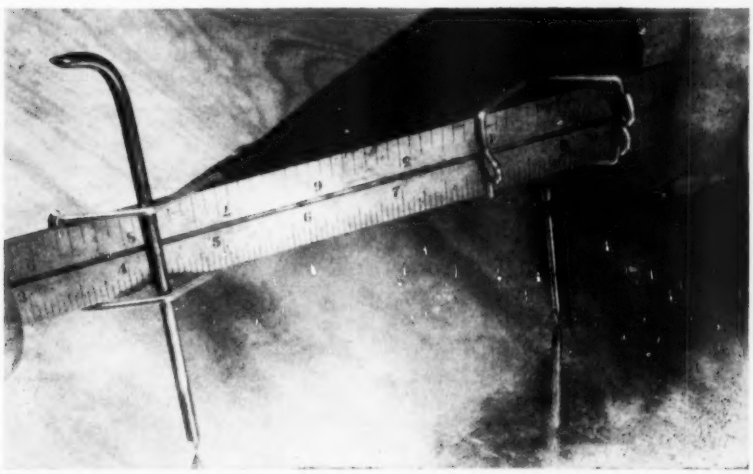
Wire Clips, Rule, and Scribing Points Make Handy Compass

Contributed by F. E. Riley

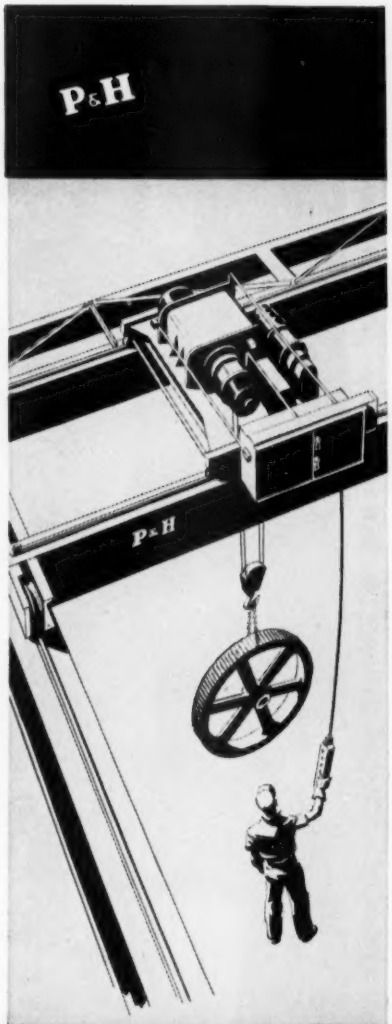
WIRE CLIPS, easily bent to shape, form the basis for an "on-the-job" compass.

In use, any pair of suitable scribing points on hand may be used as compass legs, while the backbone of the tool can be a wooden or steel rule, or simply a strip of wood.

The clips will adjust themselves to grip a scribing point or pencil firmly. Squeezing the clip ends together releases the grip for adjustment of the span, and rolling the points along the rule, without releasing the clips, will approximate micrometer adjustment.



Compass in action, scribing circle on sheet metal. Both sides of spring clips used to hold the scribes to the rule are shown, to illustrate simplicity of construction



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NEW PRINTWEIGH SCALES • NEW TRACK SCALES • NEW HOPPER SCALES • NEW BUILT-IN SCALES

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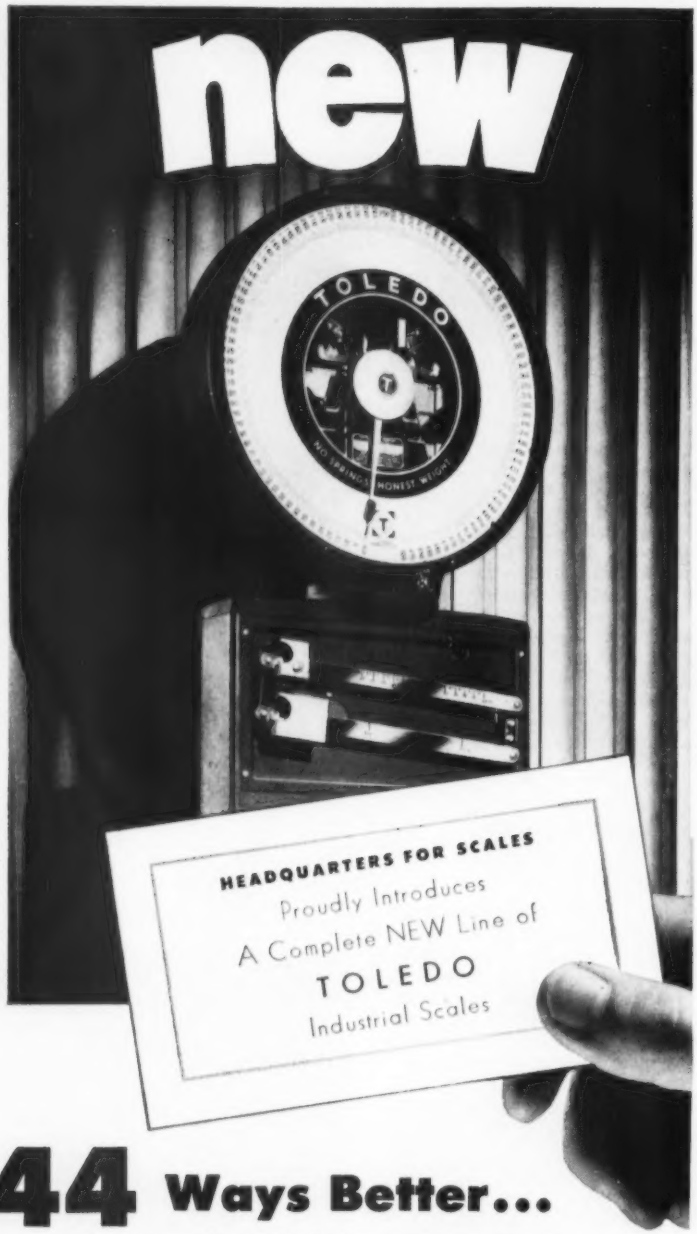

44 Ways Better...

A great new line of Toledos! *44 new features* are now added to the traditional accuracy and dependability of Toledo Scales including—double pendulum mechanism in one-piece sector design . . . dial installed to face any of eight directions . . . new clean-line design with handsome gray finish. Complete range of types and capacities. Get your scale information up-to-date . . . write today for the new condensed catalog No. 2001. Toledo Scale Company, Toledo 1, Ohio.

Model 2181 — New version of the world's most widely used portable dial scale.

Today more than ever

TOLEDO®

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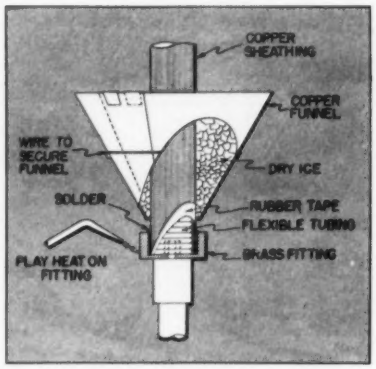
OPERATION—PRODUCTION

(O and P begins on page 60)



Cutaway view shows dry ice funnel over rubber-covered tubing for heating

fitting. With the funnel of dry ice about ¼ in. from the fitting, heat is applied to fitting to melt solder.

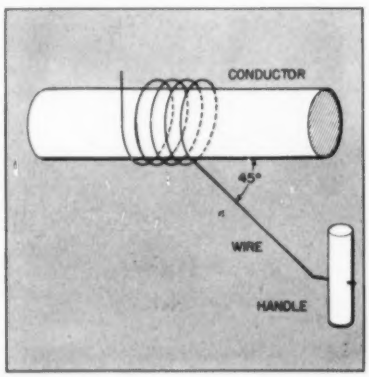
Helix Cleans Wire Leads

CLEANING sealing compound from the individual conductors of type MFHA watertight cable has been simplified by the use of a new tool at the Mare Island Naval Shipyard.

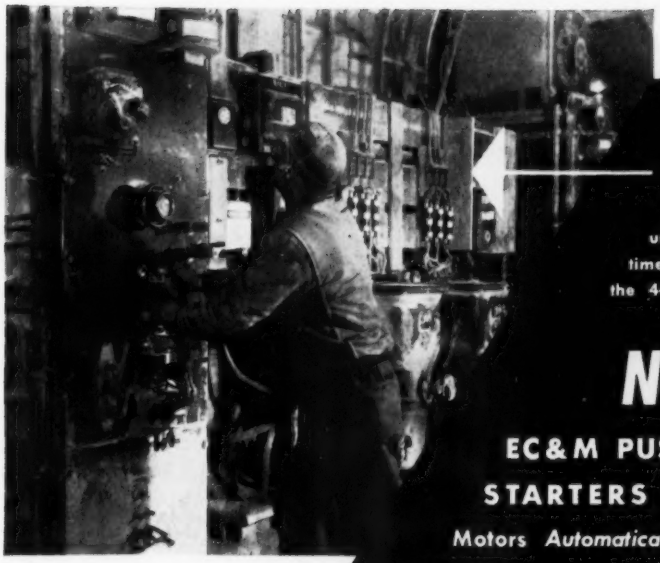
When preparing the ends of the cable for making terminations, it is necessary to remove the black compound from each insulated conductor. This exposes the colored tracers.

Solvent, formerly used, did the cleaning job but obliterated the color coding of the rayon. Wiping the leads with rags or paper proved too slow, and cutting the compound off with string damaged the cable.

The tool now in use consists of a piece of wire about 5 in. long, wound in an open helix of diameter to fit the conductor, with at least four turns spaced about ⅛ in. apart. The helix is screwed onto the conductor for the required distance and is then pulled off straight, cleaning the wire.



Wire helix with wooden handle attached, serves as useful cleaning tool



THIS IS THE WAY
THEY USED TO DO IT . . .
using manual starters, taking electrician's time to start and properly synchronize the 440-volt synchronous motors.

NOW . . .

EC&M PUSH BUTTON STARTERS Synchronize Motors *Automatically* . . . Save Time . . . Do the Job *Better.*

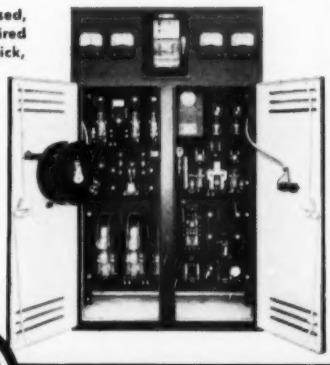
No false starts now. Push Button and Clutch Control Panel alongside each motor out in the mill.

The change-over to push button operation in this plant is typical of what is taking place in this push button age. The savings, safety, and greater efficiency of push button operation account for its increasing popularity.

As the motor approaches synchronous speed, Field Control is *automatic* by the Polarized Field-Frequency Method. Excitation of the field occurs at a point most favorable to locking the motor into synchronism. *Field removal* and *re-application* occur automatically should a voltage dip or overload momentarily cause the motor to pull out of step.

We build Synchronous Starters for all low voltages and for 2300-4600 volt power systems. Bulletins 1076-7 and 8 and No. 21 ACCELERATOR Bulletin illustrate and describe these EC&M Starters, and how they save time in getting synchronous motors on the line under full protection. May we send you copies?

Totally enclosed, completely wired units . . . quick, low-cost installation. No expensive control room.



Group of 3 Reduced Voltage Resistor-type Starters for Ohio cement plant. Three other starters are similarly grouped on overhead balcony in the control room.

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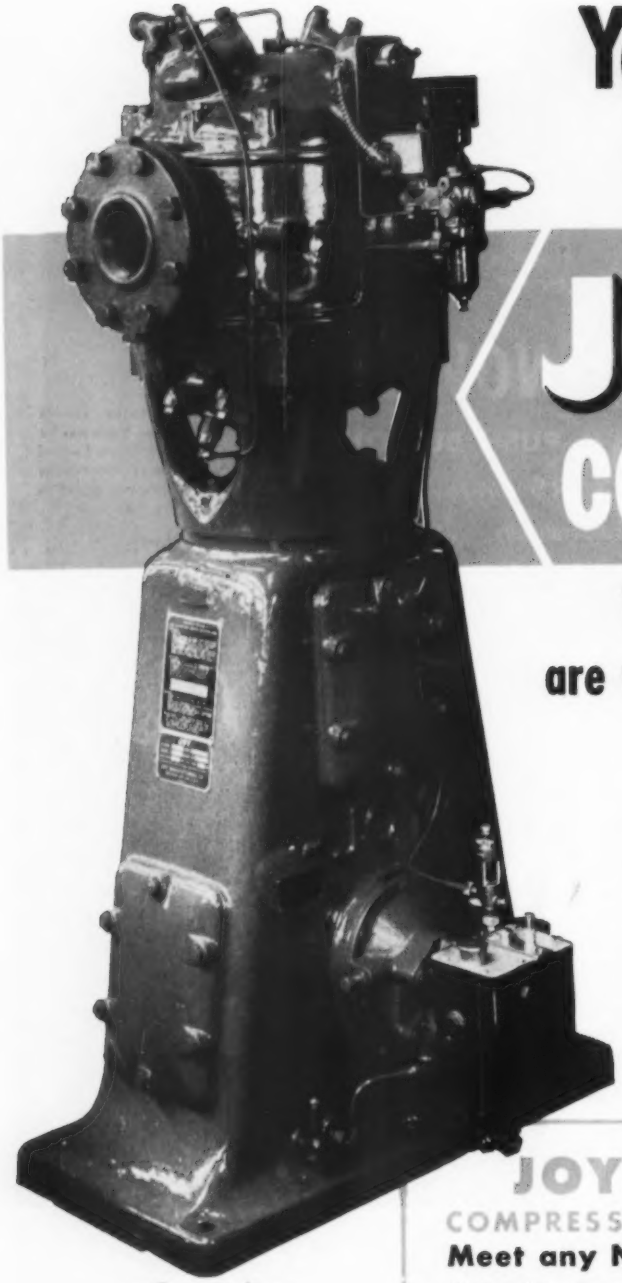

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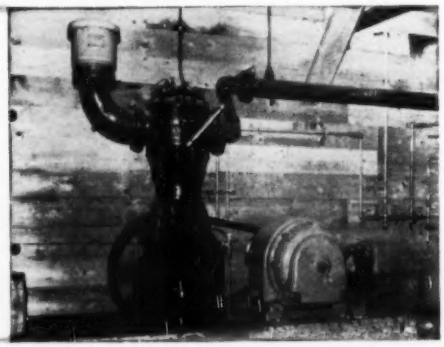

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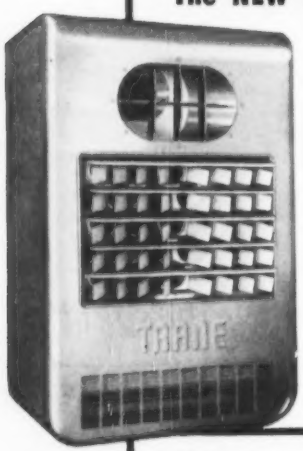

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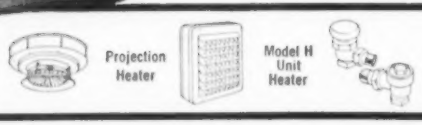
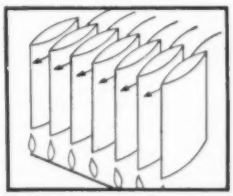
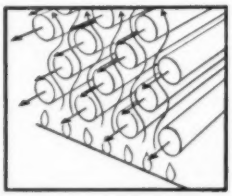




Conventional gas heaters have *vertical* chimney-like tubes. Heat rushes through in quick escape. Contact of heat with inside surface is brief. Heat escapes out the top. Room air is blown past the outside surface of the tubes. You can see why this can be so inefficient.



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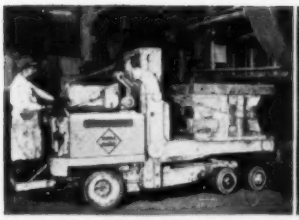
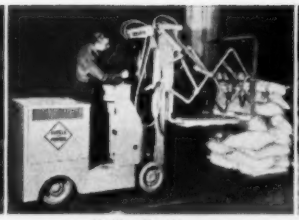
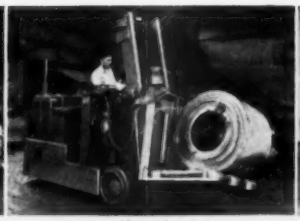


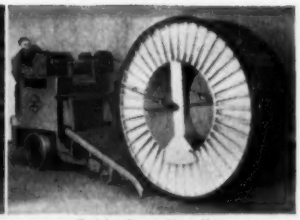
Die Handler



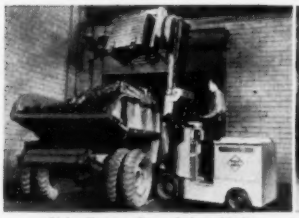
Pallet Retriever



Upender

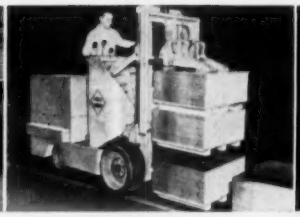


Cable Reel Handler



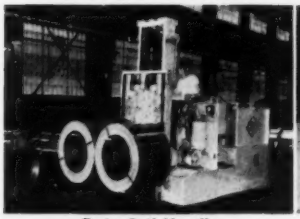
Side Dump Revolving Unit

Roll Handler with Apron



Tin Plate Clamp

Bale Clamp



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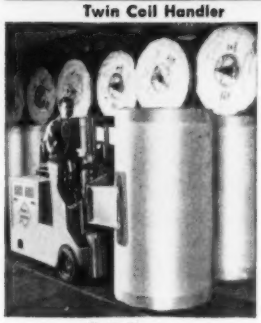
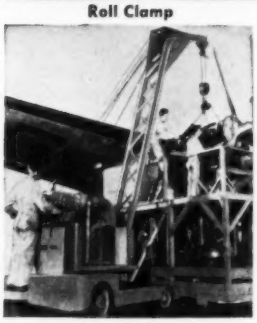


Roll Clamp



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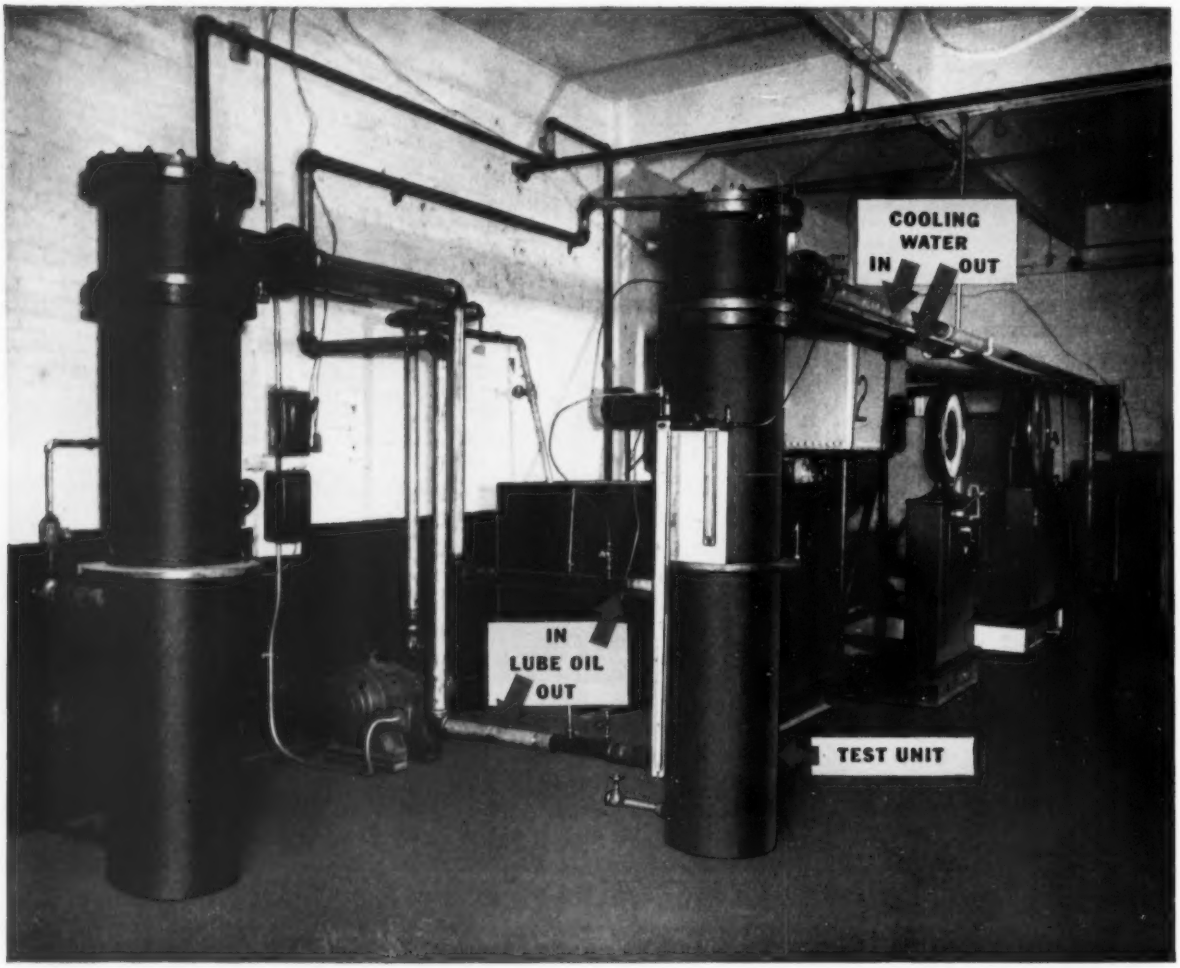

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This testing service puts a pedigree on ADSCO Heat Exchangers. These units, engineered and tailor-made to requirements, come to you exactly rated when tested by ADSCO. The exchanger can be put in the line with complete assurance it will do the job.

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CONSTRUCTION BRIEFS —a review of fundamentals for the plant engineer

Prepared by Byron A. Engelbach, Plant Engineer

REACTIONS

BEFORE A STATE of static equilibrium can be established in any body, it is necessary that the sum of all the forces acting upon a body in one direction must be balanced by the sum of another set of forces acting in direct opposition. In the case of the structural beam the loads acting downward must be balanced by an equal group of forces acting upwards at the points of support. The determination of the intensity of these reactions is the first step in computing unit stresses in beams.

Reactions are determined by the application of a fundamental principle of static equilibrium for forces acting in the same plane: The algebraic sum of the moments of all forces taken about any point in the plane in which they act shall total zero. The product of the intensity of the force and the perpendicular distance between the point of application of the force and the point of rotation is the *Moment of Force*. The *Lever Arm* is the perpendicular distance and the *Center of Moments* is the point about which the forces rotate. Forces acting upward and in a clockwise direction should be considered as plus moments and those acting downward and counter-clockwise as negative moments. It is common practice to take the point of reaction as the center of moments. Since it is advisable to establish a system or method of solution, all problems, unless otherwise specified will be solved by using the right hand reaction as the center of moments from which to calculate the moment of force.

Moment of a Single Force

In Fig. 1, a force of 1000 lb (represented by the line B-C) acts in the direction shown by the arrow head. This force is at a perpendicular distance of 8 ft from a rotating point A, represented by the dotted line A-D which is the lever arm. The moment of force about point A equals 1000 lb x 8 ft = 8000 ft-lb.

Moment of Two Forces

Fig. 2 presents a steel bar with one end pinned permitting a rotation of the bar about point C. Force F-1 tends to rotate the bar in a downward direction or counter-clockwise while the force F-2 tends to force the bar up or clockwise. The lever arms of the two forces are shown as distances of 5 ft and 4 ft for F-1 and F-2. To hold the bar in equilibrium or stationary, force F-2 must be of such magnitude operating through 4 ft of leverage as to offset the force of 10 lb operating through a leverage of 5 ft. From the law of forces the problem is set up:

$$10 \text{ lb} \times 5 \text{ ft} = \text{F-2} \times 4 \text{ ft}$$

by transposition

$$\text{F-2} = \frac{10 \text{ lb} \times 5}{4} = 12.5 \text{ lb}$$

Moments Applied to Reactions

When determining the reactions due to a concentrated load on a beam, what is really done is to use the center of moments at one support and calculate the unknown force required at the opposite support to establish equilibrium.

Fig. 3 illustrates a beam whose span is 20 ft with a concentrated load of 15,000 lb, 5 ft to the left of the right hand reaction. It is apparent that the concentrated load tends to rotate the beam downward about the reaction point R-2 (F-2) through a leverage arm of 5 ft. In opposition to this counter-clockwise moment is the left hand reaction R-1 (F-1) acting upward and clockwise through a lever arm of 20 ft.

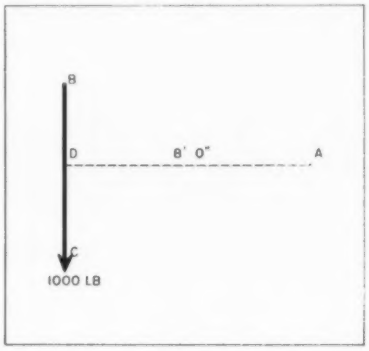

Fig. 1. Force acts through lever arm AD

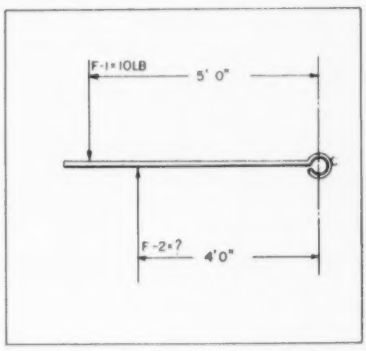

Fig. 2. Reactions hold bar in equilibrium

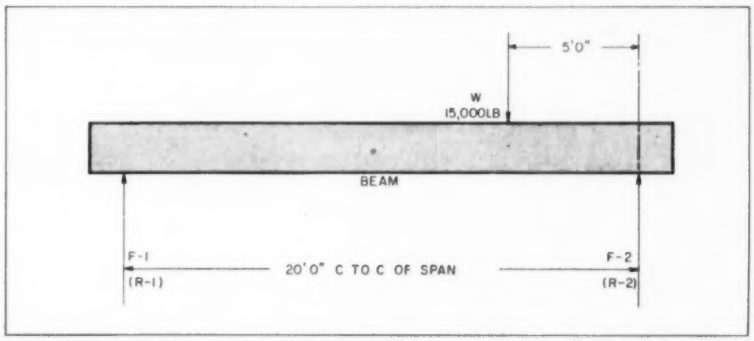

Fig. 3. In loaded beam arrangement, load W acts through lever arm, around R-2

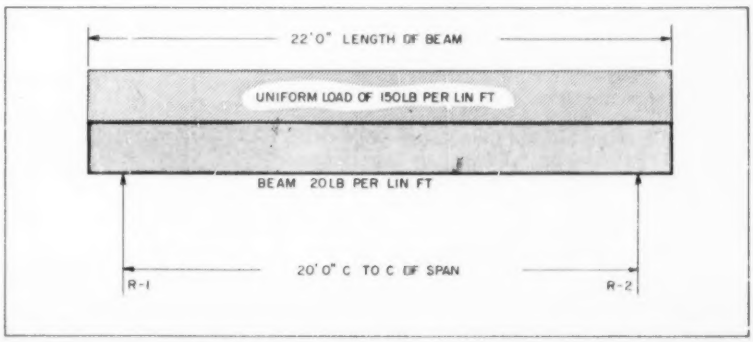

Fig. 4. Uniformly loaded beam example. Each support carries half of total load

If the moments of these two forces are equal, the beam will be in equilibrium. Hence:

F-1 x 20 ft = 15,000 lb x 5 ft

by transposition

$$F\text{-}1 = \frac{15{,}000 \text{ lb} \times 5}{20} = 3750 \text{ lb}$$

Uniform Load

When a beam supports a uniform load over the entire length as shown in Fig. 4, it is evident by inspection that each support must carry a load equal to one half the total load. Assuming the beam to weigh 20 lb per lin ft, the beam will weigh 20 lb x 22 ft = 440 lb. The *Uniform Load* will be assumed to be 150 lb per lin ft of beam and will weigh 150 lb x 22 = 3300 lb. Together the total load to be supported will be 440 + 3300 = 3740 lb. The reaction will be one half of this amount or 1870 lb.

Concentrated Load at Mid-Span

Fig. 5 illustrates a single concentrated load located at mid-span. It is apparent that this load results in end reactions which are one half the total load. If the weight of the beam (which is uniform) is neglected then the end reactions are each 1000 lb if the total load is 2000 lb.

Concentrated Load at Any Point

When a concentrated load is placed at any point on a beam, the reaction at one end is found by multiplying the load by the distance of the load from the opposite end, dividing by the span length of the beam. Refer to Fig. 3 and observe that the concentrated load of 15,000 lb is located 5 ft to the left of the right end reaction. Neglecting the uniform weight of the beam, the intensity of the left end reaction would be found as follows:

$$R\text{-}1 = \frac{15{,}000 \text{ lb} \times 5}{20} = 3750 \text{ lb}$$

Multiple Concentrated Loads

The end reaction of any number of concentrated loads would be found in a similar manner as indicated above. The end reaction of each specific load is found and the sum of these reactions is the *Total End Reaction*. Fig. 6 illustrates a beam with three concentrated loads. The span center to center is 25 ft and the distance of each load from the right hand end reaction increases in 5 ft intervals. The weight of the beam will be neglected in this problem. To find the left hand end reaction R-1, proceed as follows:

R-1 for W-1 = 7000 x 5/25 = 1400 lb
R-1 for W-2 = 6000 x 10/25 = 2400 lb
R-1 for W-3 = 5000 x 15/25 = 3000 lb

Total R-1 = 6800 lb

Combined Uniform and Concentrated Loads

Refer to Fig. 6 which shows the beam weight as 100 lb per lin ft. To correctly calculate the end reactions this beam weight must be included in the sum total of reactions. No complications are presented since it is known that the reaction for each load must be calculated individually. The solution will be as follows:

R-1 for W-1 = 7000 x 5/25 = 1400 lb
R-1 for W-2 = 6000 x 10/25 = 2400 lb
R-1 for W-3 = 5000 x 15/25 = 3000 lb
R-1 for U.L. = 100 x 25/2 = 1250 lb

Total R-1 = 8050 lb

Uniform Load on Portion of Span and Concentrated Load

A uniform load covering only a portion of a beam span is treated as a concentrated load acting on the beam at the center of gravity of the uniform load. Thus, in Fig.7, the uniform load of 600 lb per lin ft extending for 8 ft totals 600 x 8 = 4800 lb acting at the center of gravity or 20 ft from the right hand reaction. The total reaction at R-1 would then be calculated as follows:

U.L. (600 x 8) x 20/30 = 3200 lb
U.L. 120 x 30/2 = 1800 lb
12000 x 5/30 = 2000 lb
6000 x 10/30 = 2000 lb

Total R-1 = 9000 lb

Sum of Reactions Equals Total Load

Since the reactions are the supporting forces of a beam, and all beams are calculated for equilibrium, the sum of the loads will equal the sum of the end reactions. This fact is a good point to remember when complicated loading is involved in the calculations. It can be used as a check method for reaction calculations. After finding R-1, R-2 is found and the sum of these two must equal the sum of the loads acting on the beam.

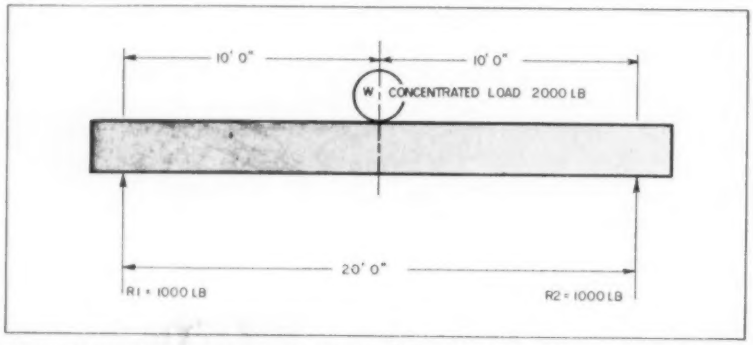

Fig. 5. Concentrated load at mid-span of beam. End reactions carry half load

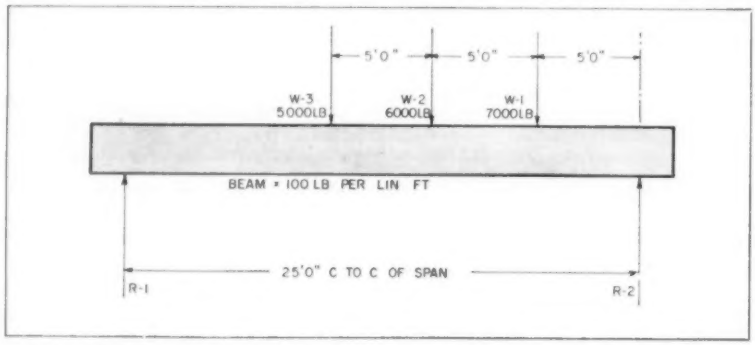

Fig. 6. Beam with three loads. Left end reaction equals sum of three reactions

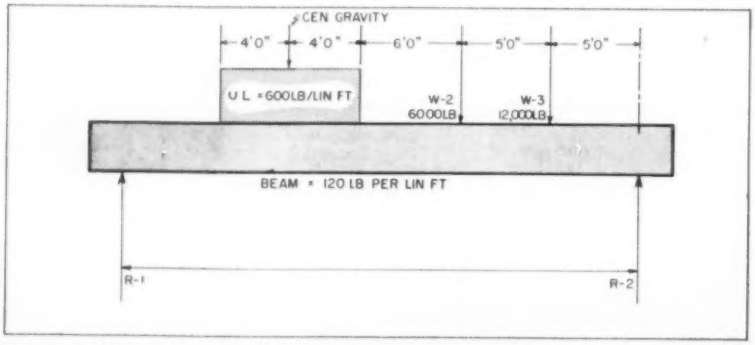

Fig. 7. Uniform load covering portion of span is figured as concentrated load

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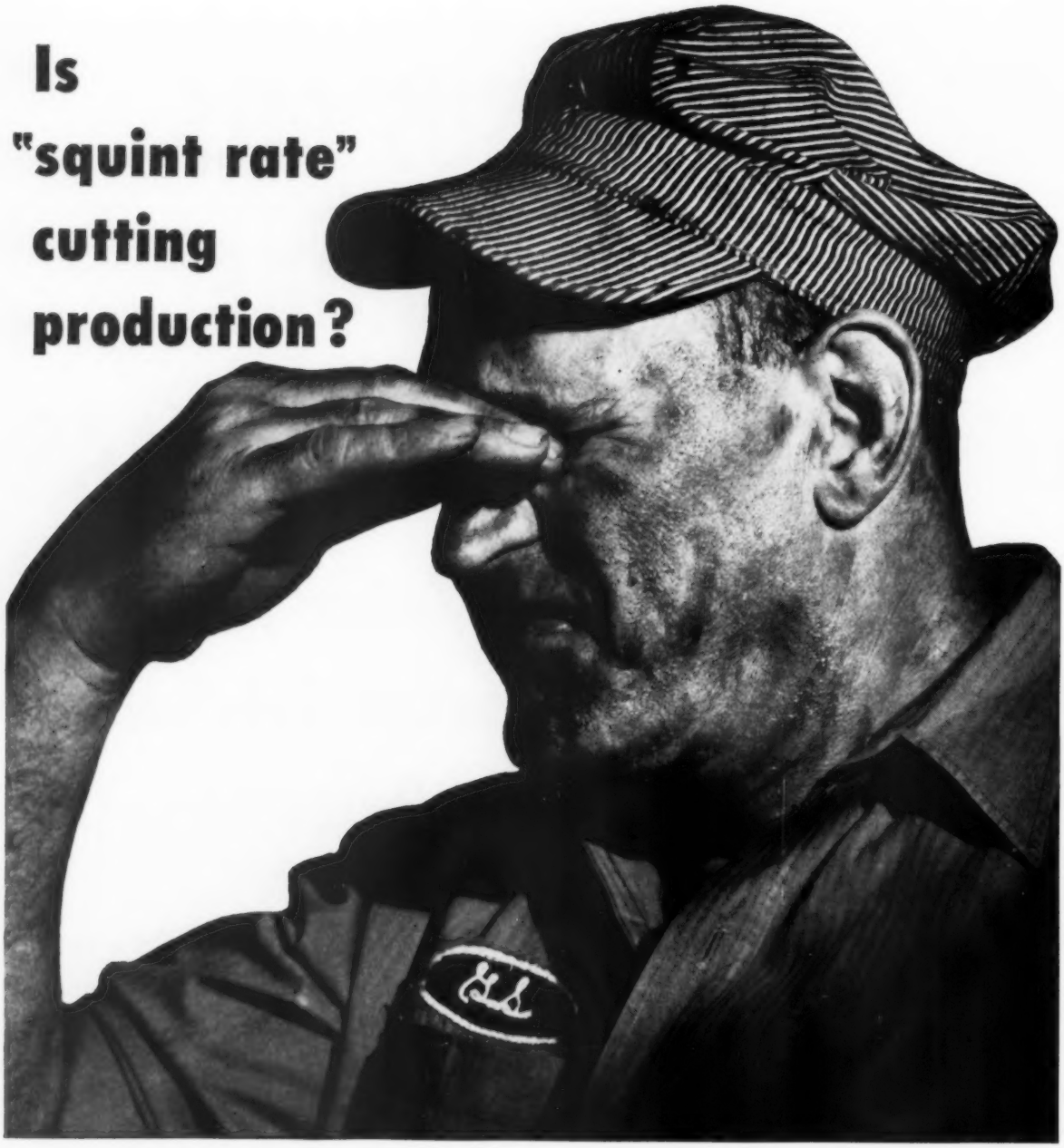


If, occasionally, a man in your plant stops his work, squints, rubs his eyes—that could be defective eyesight.

But, if man after man is showing this tell-tale sign of faulty vision – there's something else wrong. And it's an odds-on bet that the cause is bad lighting.

Inadequate or glare-ridden plant lighting, or both, can't help but eat into your people's efficiency and cut production. The very first requisite of a good man, no matter how skilled, is that he be able to see what he's doing, easily, comfortably, without strain.

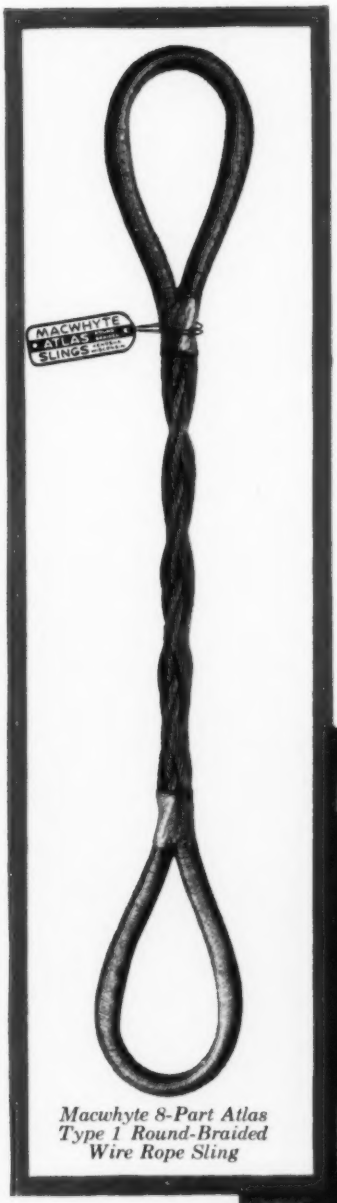
Poor plant lighting is unfortunate, too, because the difference in first cost between a good and bad installation is surprisingly little. And the healthy upsurge of production you get with good lighting returns many times over that small difference in cost.

Check the "squint rate" in your plant. Isn't it time to call a halt on lighting that's *costing you money?* Isn't it time to change to lighting that *helps production?* Write for information about Day-Brite's CFI DAY-LINE® industrial fixtures—called CFI because they're designed and built to guarantee COMFORT FOR INDUSTRY.

For more facts circle 563 on Reply Card

"DECIDEDLY BETTER"
DAY-BRITE®
Lighting Fixtures

Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario. 348



Macwhyte 8-Part Atlas Type 1 Round-Braided Wire Rope Sling

GREATER SLING FLEXIBILITY THROUGH

BALANCED BRAIDING

Macwhyte's Atlas Braided Slings

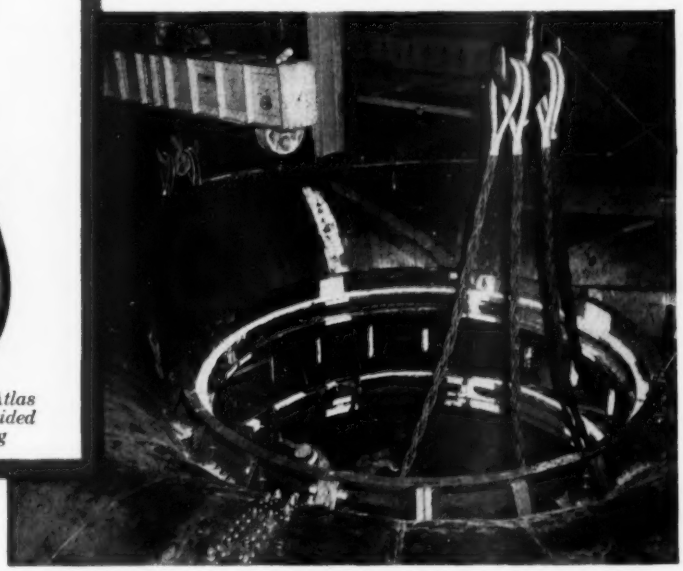
Atlas Braided Slings have far greater flexibility because of Macwhyte's *balanced* method of construction:
1) Ropes are spliced endless before braiding.
2) Right lay ropes balance left lay ropes.
3) All ropes follow uniform spiral paths, assuring balanced tension throughout the sling body.

Macwhyte's "Balanced Braid" permits fuller, safer gripping . . . no kinking . . . no spinning . . . faster materials handling.

Complete line of slings for every need

Three body types are available: Atlas Round-Braided, Drew Flat-Braided, Monarch Single-Part. All are made to order in any size for any job.

Our sling engineers will be glad to study your sling needs and make recommendations promptly.



115 Ton Casing Assembly Handled with Macwhyte Atlas Type 1, Round-Braided Wire Rope Slings.

Photo courtesy Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

MACWHYTE SLINGS

Ask for New Circular No. 5308

Lists strengths and safe-loads for ATLAS Round-Braided, DREW Flat-Braided, and MONARCH Single-Part Slings.

For cranes and hoists specify PREformed Monarch Whyte Strand Crane Rope made by Macwhyte. Ask for Folder 50-25.

MACWHYTE COMPANY
KENOSHA, WIS.

MACWHYTE COMPANY
2991 Fourteenth Ave., Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable, Safe-Lock Assemblies, Monel Metal and Stainless Steel Wire Rope.

Mill depots: New York • Pittsburgh • Chicago St. Paul • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

10438

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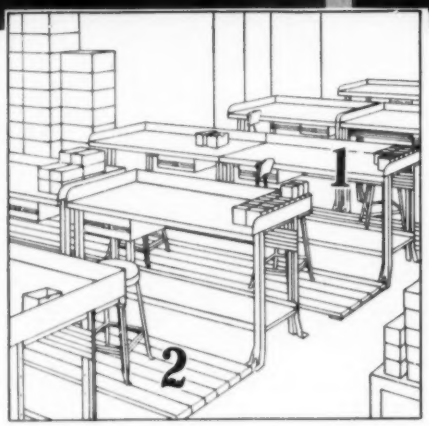
A PRACTICAL PACKAGING AREA—CUSTOM BUILT with Standard HALLOWELL Shop Equipment

Standard HALLOWELL Steel Shop Equipment makes it easy for you to set up a *custom-built* packaging area in your plant. All you have to do is lay out the space as you want it—and order the ready-made equipment from your HALLOWELL industrial distributor. Write us for details. STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.



1. Work Benches 2. Stools and Chairs

Our Fiftieth Year : A START FOR THE FUTURE

HALLOWELL SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

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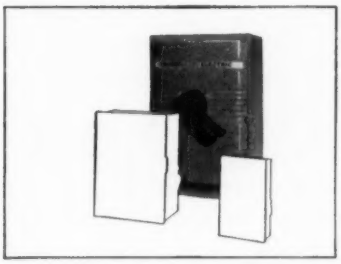
3 Complete Lines

OF TRUMBULL SAFETY SWITCHES

to fit practically any low voltage application with a new high in dollar value

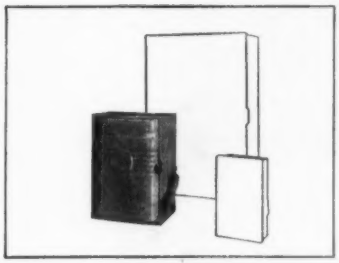
When you select a switch from this complete and superior Trumbull line, you can be sure of getting the best possible device for a clearly defined type of service—and the best combination of favorable first cost and continuing economy of operation.



***HEAVY DUTY INDUSTRIAL**

Exceeds NEMA Type A Standards

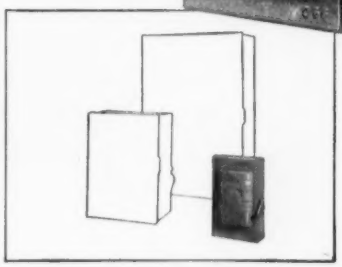
The Trumbull Style HCI Front Operated Safety Switch is without any question the finest switch ever built by Trumbull, the Safety Switch leader. It has every installation convenience, every operating and maintenance advantage, and all the protection we know how to build into a switch. Its unique and thoroughly proved pole units introduce a basically superior switching principle. It is deliberately designed and built to exceed today's requirements and last as near to forever as a switch can.



***STANDARD DUTY**

Meets NEMA Type A Standards

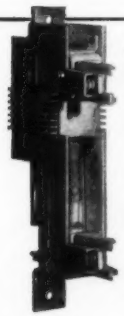
The Trumbull Style HCI Side Operated Safety Switch will meet all but the most rugged demands with *plenty* to spare. It features the HCI pole unit with circuit breaker arc quenching action. While it meets NEMA Type "A" specifications it offers substantial cost savings. No Trumbull safety switch ever offered more for the money.



GENERAL USE

Meets NEMA Type D Standards

The Trumbull Style D Safety Switch is designed for many applications where service is not severe and continued overloads unlikely. This well-engineered and sturdily built switch does its job at real savings in first cost. It is suited for use in many distribution and branch circuits, for flood or sign lighting, service entrances, heating and air conditioning equipment.



***The pole units** *of Style HCI switches feature the magnetic-repulsion principle of arc-quenching, similar to that of a modern circuit breaker. Grid pins break up and quickly dissipate the arc. Double-break visible contacts are actuated by a heavy spring, with practically instantaneous make and break. These exclusive features result in high interrupting capacity and longer switch life.*

There is a Trumbull safety switch to meet practically any application up to 1200 amperes, 600 volts AC or DC. For details see your Trumbull Distributor or write us direct about your requirements.

TRUMBULL T ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

For more facts circle 566 on Reply Card

new WIDER VISION

for easier remote boiler water level readings

■ Vastly improved visibility of remote boiler water level readings can now be enjoyed by boiler plant operators.

A new "wide vision" face on Yarway Remote Liquid Level Indicators allows reading from the side as well as front of the indicator. Boiler water levels and other liquid levels can be checked from most any position.

Indicating mechanism is operated by the boiler water level itself—assuring instant, accurate readings.

Yarway Indicators are of the manometric type with automatic temperature compensation, as approved for use under the recent A.S.M.E. Boiler Code Committee ruling in Case # 1155.

Over 10,000 are used throughout industry for boiler water and other liquid level indication . . . and for superheater pressure differential indication aboard ship.

For full information write for Bulletin WG-1823.

YARNALL-WARING COMPANY
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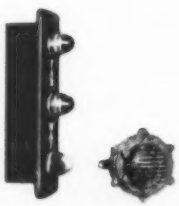
BRANCH OFFICES IN PRINCIPAL CITIES

A COMPLETE YARWAY SYSTEM

Besides Remote Liquid Level Indicators, Yarway also offers Liquid Level Recorders and Remote Signal Alarms . . . making a complete system for constant, accurate liquid level check.

■ Yarway Hi-Lo-Graph Recorder provides not only water level indication, but also a 24-hour recording of water levels. See Yarway Bulletin WG-1830.



■ Yarway Remote Hi-Lo-Alarm Signals—lights or horns—can be placed at any location in plant. See Yarway Bulletin WG-1823.

YARWAY® / *remote liquid level indicators*

For more facts circle 567 on Reply Card

FOOT-LOOSE MACHINERY
Raises Production 45 Per Cent Annually

Christmas comes in the middle of the summer; employees watch the race track instead of the clock; very little production equipment is "tied down" (some is on wheels); everyone is an "associate" . . . These are some of the peculiarities of the operations at Longren Aircraft which are paying labor and management handsome dividends

ONE MONDAY MORNING, as a Longren Aircraft Co. "associate" bent over his stretch press, a messenger handed him a memo.

"You are cordially invited to attend the weekly meeting of Supervisors," the memo read.

Promptly at 4:00, Wednesday afternoon, the stretch press operator, along with such other "associates" as departmental supervisors, top management and fellow associates who man heat treating tanks and micrometers, sat down to discuss and work out Longren problems. Each of Longren's 250 "associates" gets a chance to sit in with the higher echelons of management at least twice yearly. . . .

. . . . or take this example: it's July, but also a mid-year "Christmas" at the Longren plant, as bonuses, equaling 24 per cent of the last quarter's net profits, are distributed to Associates.

These two have been important factors in upping Longren's rate of productivity an average 45 per cent annually. Just how big an increase this really represents can be realized by U.S. Bureau of Labor Statistics which estimate that the average gain in output for hours worked increased only about 2 per cent annually between 1939-49 (the National Industrial Conference Board estimated the average gain at only 1.4 per cent a year during the period).

Profit Sharing

Longren's 45 per cent upsurge in productivity, far and away one of the highest among U.S. plants, is but two-years old. It began, in fact, in Sept. 1950, when Longren's youthful managing director, Hampden Wentworth and Les Aikman, Industrial Relations Director, instigated the company's new outlook on industrial relations.

All the plant's personnel—from general partners Gordon Cronkhite and Hampden Wentworth to the janitor—were brought into the profit sharing system. Simultaneously, they all became "associates."

There is yet another factor, important to plant engineers, responsible for Longren's big splurge in productivity: nomadic machines.

Longren, like a lot of other plants working as sub-contractors, is essentially a job-shop. While it has pioneered aircraft production processes and designed complicated production equip-

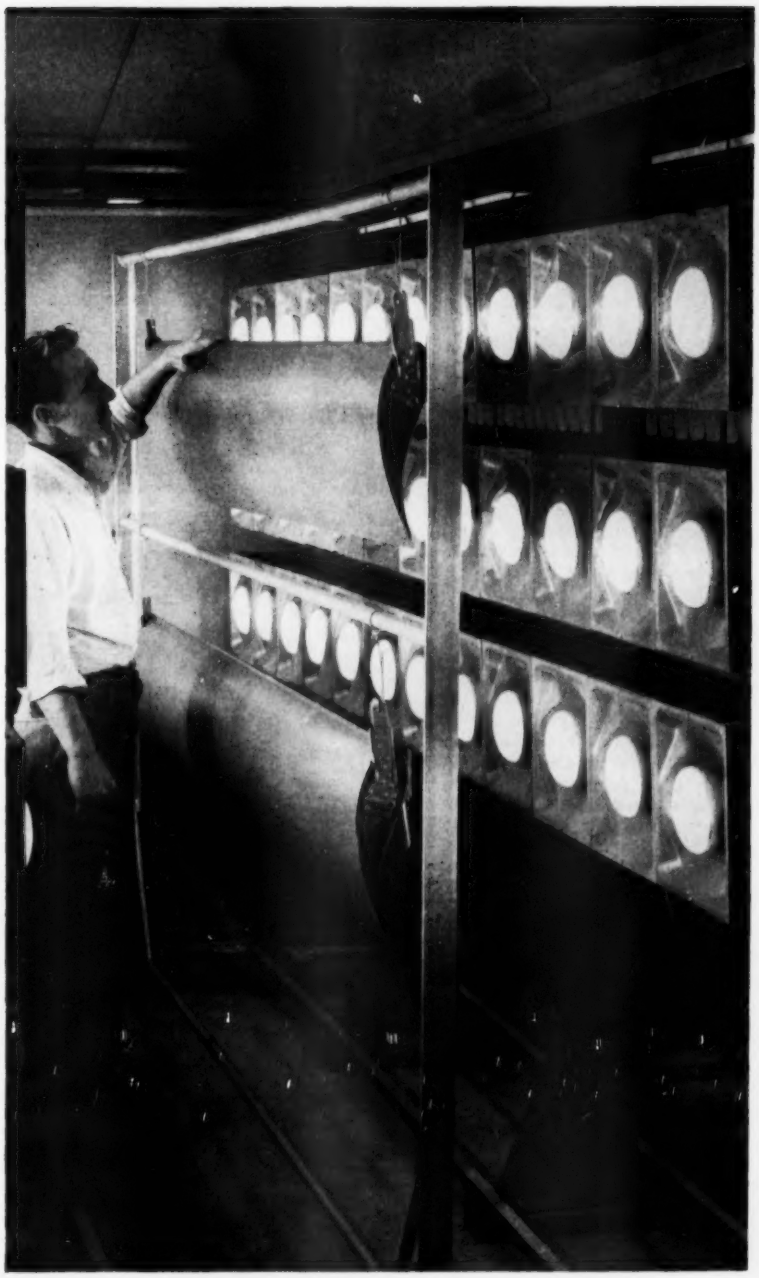


Fig. 1. Even infra-red heating units are wheel-mounted, for quick set-up anywhere

Fig. 2. Raised production means "Christmas in summer" for all Longren associates. None of the equipment is bolted down

ment, its bread-and-butter comes from sub-contracting the "tough jobs." This means that Longren's management, along with chief industrial engineer John W. Walti, can't set up anything like a straight-line assembly. Occasionally jobs call for thousands of pieces, but Longren will also turn out a single complicated aircraft assembly.

Thus, when its 20-year old plant in Torrance, Calif. was doubled in capacity (to 55,000 sq ft) last July, the new building was specifically designed around job-work. Essentially the plant consists of two production floors, separated by a supply yard. Except for the permanent installation of a paint spray department and various aging and heat treatment units, not one production machine is bolted to the floor. Instead, they're mounted on skids, supported by channel-steel legs. When a large order comes into the shop, all chief engineer Walti need do is order out the forklifts to rearrange machinery — into a production line geared specifically to the requirements of the job at hand.

Low Bids Possible

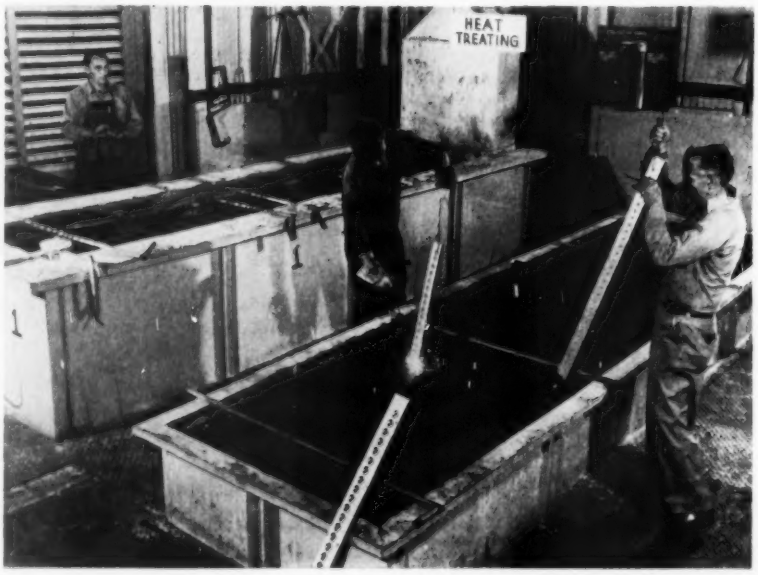
Typically, in 1952, Longren bid low on an aircraft assembly contract. But after tooling up, rearranging its production machines for greatest efficiency, it discovered such drastic overall savings that the company refunded $40,000 to the customer in credits.

Longren's "associates," kept fully informed of the transaction approved it, for they knew that any customer who winds up with $40,000 he didn't expect, will remain a customer. And that means job-security for the non-union plant.

Above-floor mounted machines minimize tear-down and set-up time between contracts. When a west coast aircraft plant ran into trouble, had to redesign a wing section and have the parts in hand pronto, Longren was able to shift its production machines during 36 hr over one weekend. Not only that, but its engineers actually designed and built a machine to meet the contract requirements within 24 hr. Since no machine tool is tied down to the production floor, it was a simple matter to move the new tool into line beside older ones.

Industrial Engineer Walti says his plant "is something like a circus"—meaning that all three rings (fabrication, tooling and assembly) can be torn

Fig. 3. Heat treating vats are among few pieces of equipment "nailed" to floor



down over night, set-up in time for the first shift.

Another feature of the Longren plant: many of the more specialized machine tools are plant-designed, plant-fabricated. Typically, when it needed a single-purpose stretch press to meet a contract's delivery date, "associates" got together, designed and built the press for about $6000. A commercially made stretch press would have cost between $35,000 and $50,000, and delivery couldn't have been expected in less than 12 months. This, plus the enthusiasm of "associates" in boosting their production, thus their bonuses, saw Longren meeting fully 90 per cent of all delivery dates. In the aircraft industry, where vendors are notoriously tardy about delivery dates, this is indeed an unusual production record.

New "associates" don't simply take their places behind a machine their first day on the job. Instead, they're introduced to fellow associates via a bulletin board titled, "Meet Our New Associates"—. New employees have their photo posted on the board, along with a short biography telling about their hobbies, home town, etc.

Another production-boosting feature is Longren's monthly performance race, where a black and white horse race one another along the Longren (production) Track. The black horse represents actual production; the white, estimated production. Associates know from past experience that to increase their quarterly take of Longren's net profits they've got to keep the black horse out front.

Personal Interest

Longren's management credits the personal interest of its associates as the major reason for boosting productivity 45 per cent annually since 1950. For example, a wing attach fitting first produced at the rate of four per day is now turned out at a rate of 75 per day. Yet the same tooling is used. The answer lies in more work per associate—and the incentive of bonuses every 90 days.

"Productivity is an attitude," proclaim posters scattered throughout the plant.

Plant layout also plays its part; it complements Longren's human industrial-relations program. Longren's 55,000 sq ft, a medium-sized production area by any count, is laid out roughly rectangular, about 1½ times as long as it is wide. Grouped on one side of the general die storage area (the supply yard) is Fabrication, Tooling, Heat Treating and Stretch Press departments, and Maintenance. On the other side are the Sheet Metal, Assembly, Inspection and Raw Materials Departments. There are few permanent walls to impede complete reshifting of departments should contracts call for a quick switch of machinery. Furthermore, what walls do exist can in most cases be torn out overnight. Moving is simple since most machines, racks and tanks are either mounted on skids, rollers or portable bases.

"At Longren," says Chief Engineer Walti, "associates don't watch the clock."

Fig. 4. Racks and workbenches in this section of final inspection are easily moved

Fig. 5. Even supply racks shown are on temporary bases for quick change of site

Fig. 6. Associates watch estimated production race with actual production

Studying the problem of machine shop layout at Taylor Instrument Companies are, left to right: Freeman Lewis and William Cope, Layout Department; George Worner, Superintendent; William Vogt, Division Superintendent; Donald Lamb, Assistant Superintendent; A. Frank Lamperton, Pl. Engineer; George Bryant, General Foreman, Machine Div

Revised Plant Layout Increases Efficiency at Taylor Instrument

TAYLOR INSTRUMENT Companies in Rochester, New York, found it necessary to add more floor space in conjunction with a production expansion program now in effect. This over-all plan is geared for a 25-year schedule and each phase is being worked out carefully.

The first step in the plan was the erection of a new building, now completed, which allows approximately 44,000 sq ft of floor space.

It is presently a one-story construction but three more floors can be added if desired. Most raw materials enter the plant through this new building and proceed to inspection, storage or machining areas and from there, when finished, to shipping in one progressive, easily handled, U-shaped operation.

Materials Flow Problem

The additional space has allowed the Machine Division 85 per cent more floor space, while the area vacated by this department in the old building will be used for a complete new section—a Panel Manufacturing Department, where instrument panels will be made, finished and fitted. Other new equipment will also be installed in other space vacated by machines set up in the new building.

The main plant, built in 1906, had three wings and others have been added since. These wings, however, created a problem for the flow of materials as the duplication of fire walls within the plant led to blocked-off areas in which it was difficult to set up machining or assembly departments. Columns were also so spaced that aisles were limited to 6 ft, too narrow for the successful manipulation of power trucks.

In the old building the receiving department was in the center of the plant, surrounded by other buildings and departments, which made it hard to reach by either outbound or inbound trucks. The small receiving yard had become definitely inadequate for the large delivery trucks of today as well as for the increased volume of materials handled.

In the new building, where more space is available, it is possible to have wider aisles. There is now one 10 ft wide express aisle running the length of the new building and one 8 ft cross aisle, which will later be continued into the old building. Compiete plans call for two more express aisles and other 7 or 8 ft cross aisles.

Formerly materials were handled by platform lift trucks and skids on the first floor and by hydraulic hand lift trucks and wooden cabinet type hand trucks on the upper floors. Loads were made up of small quantity items and carried in trays on the trucks. Now riding type hand and electric trucks are used in both the new and the old buildings. Materials are moved by hoist on a monorail in the receiving department and there are two craneways, each with a 2-ton hoist, in the raw materials storage department.

Storage and Receiving

Originally there were four storage areas for in-coming materials, which were then routed to points as near as possible to the departments where they would be needed, but some were stored on upper floors where they were not too accessible and, at best, there was considerable unnecessary traffic, and often a duplication of operations in this scattered arrangement of materials and departments.

The new building has made other improvements possible. The new receiving department is no longer surrounded by other buildings but faces directly on a dead-end street on the west side of the plant, thus assuring a minimum of traffic troubles. The receiving yard, 78 by 24 ft in size, is enclosed to keep out snow and rain and is heated during the winter. It is entered over a 12 ft ramp, also heated by underground pipes for snow melting.

The yard and ramp were difficult to construct as trucks must back

And here is the result of planning that took place in activities on opposite page. This is the new machine shop equipped with the most modern tools and facilities. Note the uncluttered appearance, good lighting, cheerful surroundings and plenty of room for movement of raw materials and the finished products

Although this is but the start of a 25 year plan, the changes made thus far have brought about better materials handling, a reduction of in-plant traffic, increased production through grouping of related departments, better control of parts, better storage and service areas

By **A. FRANK LAMBERTON**
Plant Engineer,
Taylor Instrument Cos.

down approximately an 8½ per cent grade. Before making the installation experiments were made by Taylor engineers with miniature trucks and a simulated yard and street. The maneuverability of the trucks on the ramp and in the narrow, 26 ft street outside the entrance was thus established.

Traffic Control

The receiving yard is entered through two outside motor operated rolling steel shutter doors approximately 22 ft wide by 14 ft high, which rise automatically but close by constant pressure switch only. This last is a very important safety measure.

There are four loading docks at each of which is a levelling platform which allows a range of 18 in. both above and below the dock level to accommodate the floor heights of the many types of trucks which call at Taylor's. A guard at the street tells drivers which dock to use and this information is relayed by intercommunication telephone to the receiving office foreman, whose office is located near the docks.

Hand-operated doors at three of the docks are 8 by 8 ft in size and these are used for most deliveries. The fourth is a double swinging door, 10 ft wide and 12 ft high. Above this door is a 2-ton monorail which extends 35 ft into the receiving yard and 88 ft inside the plant, passing over a large floor scale. This dock is used to bring in large machinery and for the handling of large panels, boxes and such items which are often weighed directly from the rail.

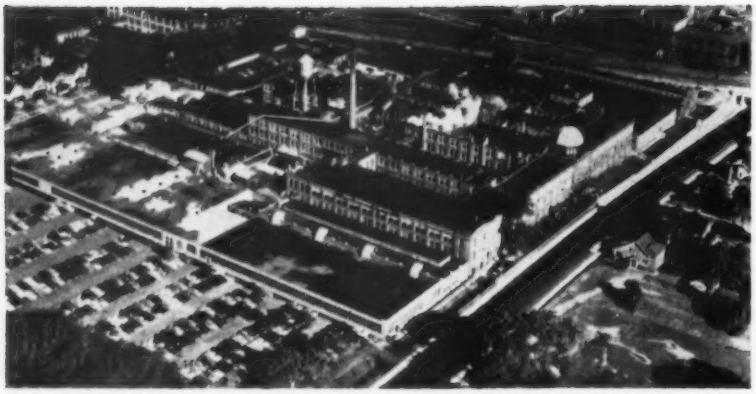
The heating arrangements for the receiving yard were carefully worked out to assure a minimum of draft and resultant discomfort for employees working just inside the inner doors. Two heaters have been set up in the receiving yard and go on automatically each time an outside door opens. Also, there are three heaters placed inside the four loading doors, thermostatically controlled. This system has proved satisfactory throughout the winter months. The heaters in the yard prevent cold air rushing in when the doors are opened, while the inside heaters maintain an even temperature under all conditions. Thus, what was feared might be a problem was easily solved.

Adjacent to the large door are 800 sq ft of space used as a parcel post department, for the sorting of incoming items only. Out-going parcel post is handled from a shipping department in the old building.

Metal scrap is stored in an area which is parallel to the south side of the receiving yard. Bar and sheet stock is located in a section to the north of the receiving department. Sheet metal and roll and bar stock is each in its own particular space under a craneway which may move materials to a levelling table for the shear which has been installed between the raw stock department and the automatic screw machines.

Grouping of Machines

Across an aisle from these machines are lathes and hand screw machines, while also nearby are the Swiss type automatic machines used for very small parts. These departments are grouped around the tool crib, tool grinding department and a centrally located degreasing sta-



Aerial view of Taylor Instrument's Rochester plant shows new buildings at left

tion. Toilets and locker rooms are also centrally located in the new building.

New materials entering through the receiving department go first to inspection. Due to the nature of Taylor products inspection of all raw materials is highly important. The line includes instruments from a simple household thermometer to intricate and highly scientific instruments for use in industry, the medical practice and such specialized fields as the production of nuclear energy at various AEC installations.

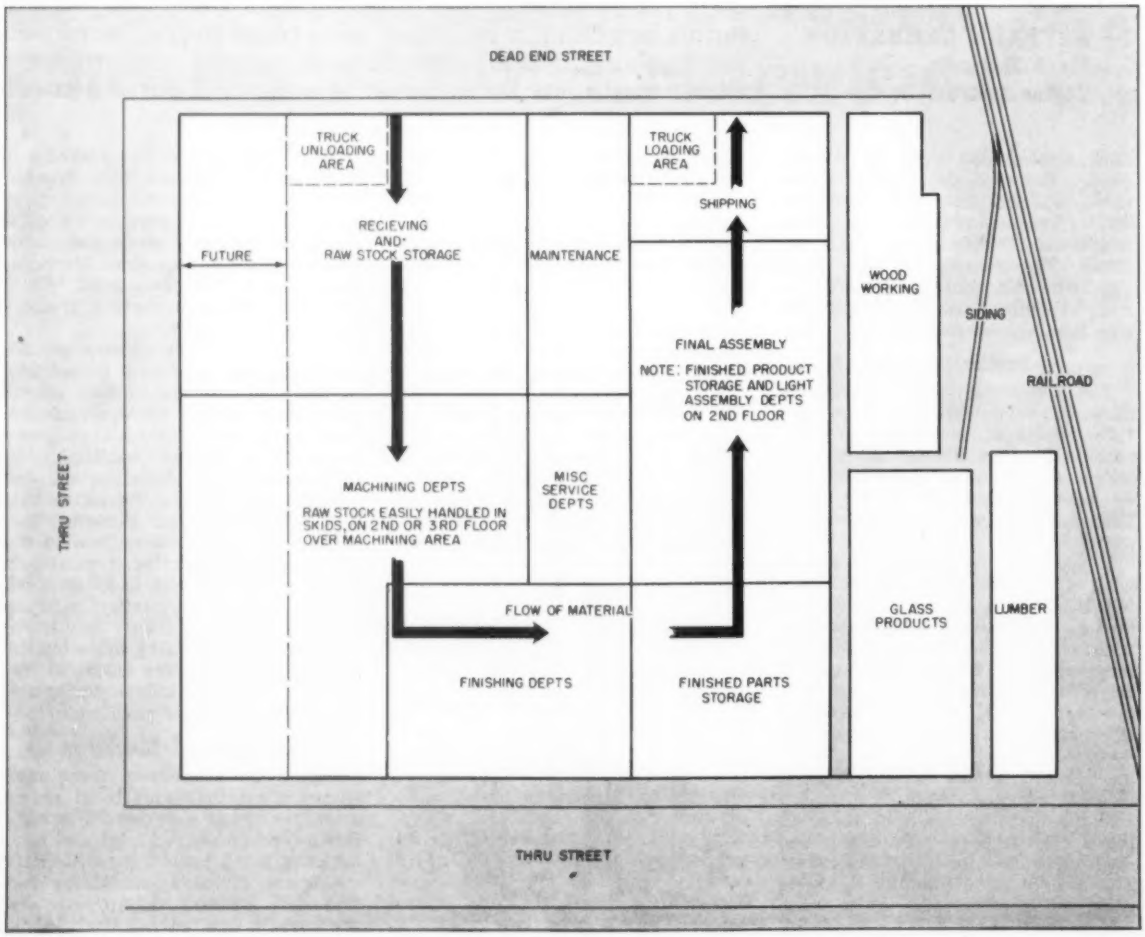
Industrial instruments are used for indicating, recording and controlling temperature, pressure, flow, liquid level and humidity in hundreds of applications. In all there are approximately 8,000 variations of the basic lines using over 30,000 parts, mostly small and requiring extreme accuracy in manufacture.

From inspection, materials go to storage on the north side of the building or, as required, to machining, processing and fabricating areas. When the 25-year plan is complete there will be a smooth movement forward to the finishing departments and finished parts storage, to assembly departments, finished products storage and finally to wrapping and shipping. All this will be done with a minimum of overlapping of operations or movement.

Manufacturing Benefits

While the plan is but started, the initial steps in the expansion program have already proved of great benefit to the whole manufacturing cycle. The new receiving yard, better materials handling equipment and facilities, plus the new inspection, storage and machining departments in the new building mean a reduction of in-plant traffic, increased efficiency of related departments through the grouping of similar activities in one area, better control of parts, service areas more strategically located and storage spaces for heavy and hard to handle stock more easily accessible.

Diagram of materials movement through Taylor Instrument plant. It is a clean, U-shaped flow of material and product



ELECTRICAL SYSTEM Keeps Pace with Plant Changes

By HOWARD T. BAILEY, Electrical Engineer,
Brillion Iron Works, Inc.

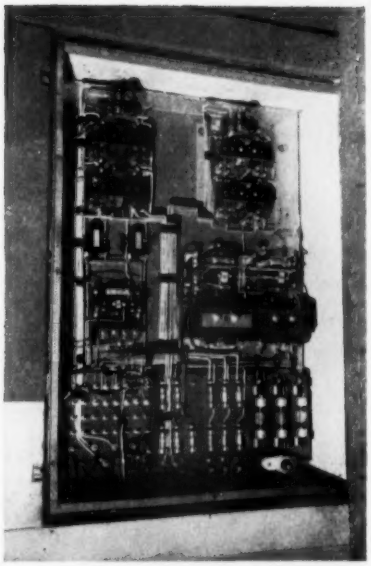


Fig. 1. Since the installation of this panel which controls four motors, there has been no serious trouble to system

MODERNIZATION, coupled with a worthwhile program of preventive maintenance, can work wonders toward keeping a plant running smoothly and efficiently at a minimum of cost.

It is common practice in some plant maintenance departments to "patch up the job" so that it works, with the intention of doing a better job at a later date.

This type of maintenance usually keeps the wheels rolling, but eventually the "patched up job" fails at an inopportune time causing confusion in that particular department. This usually results in expensive shutdowns that could otherwise have been prevented if a good program of preventive measures had been carried out.

In Step With Progress

In any progressive plant, it is an absolute must to keep the electrical system in step with the plant's progress. This has been accomplished at the Brillion Iron Works by redesigning our electrical controls as it was deemed necessary.

Figure 1 shows a control panel that controls four motors. The originally manufactured panel had no provisions for individual protection of each motor circuit nor did the control circuit have any fuses. In fact the entire panel was fused at 200 amp, causing disastrous results whenever a short developed in the control circuit. Since this redesigned panel has been installed no serious trouble has been experienced.

Figure 2 (left) is a control panel of a core mold conveyor. These controls, with associated limit switches, were operated at a potential of 240 volts. The controls were subjected to extreme heat that often resulted in grounded wiring with the usual shutdowns until the trouble was remedied. Figure 3 (right) is the latest version of this control panel. As shown by the photo, all open wiring has been eliminated and is compact and easily accessible. The control voltage has been reduced from 240 volts to 24 volts.

There has been no down time since this panel was installed over six months ago. Previous to this the average maintenance on the one machine was approximately two hours per day.

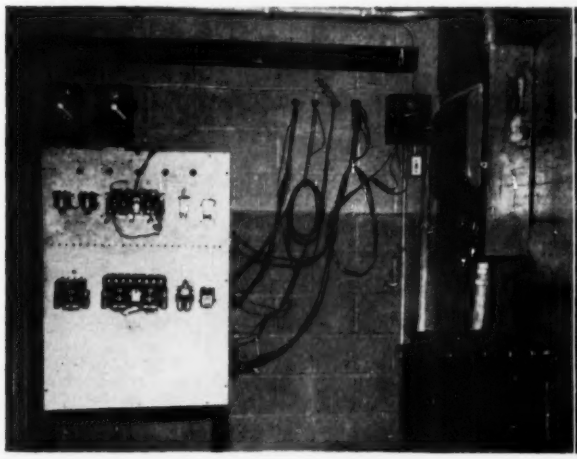
It has been the policy of management to make needed improvements as deemed necessary. Any controls that are outmoded are redesigned to conform to the standards of present day conditions.

All motor starter contacts are periodically checked and much emphasis is placed on proper overload protection. Burned out motors are costly even from the rewinding expense. However, the down time invariably overshadows this by an extensive margin. Motors will burn out even with proper overload protection but it can be kept at a minimum if this end of the program is fully carried out.

In our central heating plant a 300 hp completely automatic boiler operates at 15 psi. One electrician is assigned the job of checking and cleaning the burner and controls every day.

Starting panels and compensators in the air compressor room are inspected regularly. All motors are also blown out weekly. Like the boiler room, the floors and compressors are kept spotlessly clean and this has helped considerably toward the trouble-free operation of this equipment.

Fig. 2. Left: The core mold conveyor control panel looked like this before it was redesigned. Fig. 3. Right: Redesigned panel is compact and easily accessible. Control voltage in the present panel has been reduced from 240 to 24 volts.



Photos this page: Hercules Powder Co.

Fig. 1. Citrus peeling storage bin of wood, and sugar storage bin of metal, at Golden Citrus Juices, Inc., plant are painted with chlorinated rubber paints specifically formulated for use against hazards encountered in citrus industry

Fig. 2. Here is another citrus products plant, Real Gold, in Anaheim, Calif., that is completely finished in an aluminum paint specially formulated and based on chlorinated rubber. Maintenance costs are low due to the paint's resistance to moist sea air and heavy fogs. Use of the finish, even on moving belts and processing machinery, has permitted cleaning

Maintenance Painting Problems

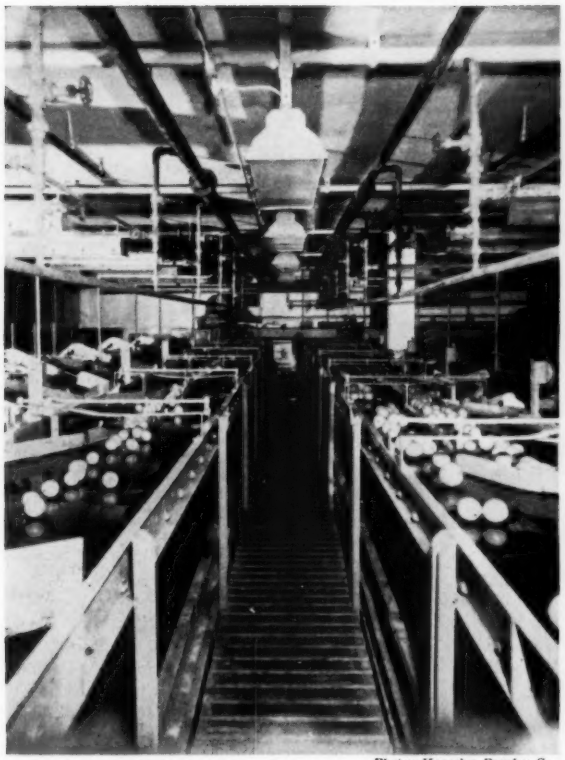


Photo: Hercules Powder Co.

Fig. 3. Feed belts at Golden Citrus Juices, which convey fruit to juice extractor. Like other units in the plant, this line is cleaned weekly with a caustic solution to remove accumulated citric acid and dirt. The finish shown here was in excellent condition after a full season of use. Finishes are applied with a minimum of preparatory work

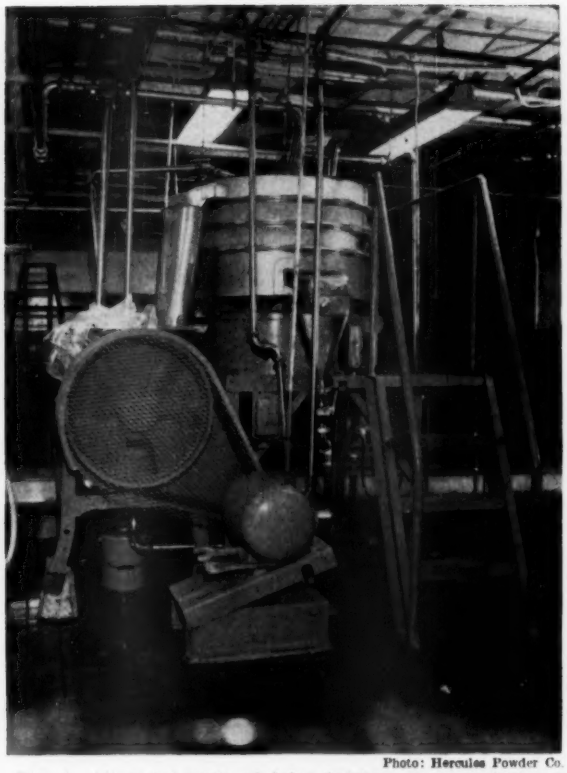


Photo: Hercules Powder Co.

Fig. 4. All metal parts of juice finisher at same plant are made of stainless steel and are painted with same type of enamel. This unit is used to extract seeds and pulp from juice and must be thoroughly cleaned with a caustic solution weekly. Previous finishes employed discolored after the first cleaning; present finish has lasted for full season

in the Food Industry

Sugar and food acids, two of concrete's mortal enemies, have always presented food products plant engineers with grave problems . . . This picture story tells how two plants met the problem—overhead and underfoot

ALMOST IMPOSSIBLE demands are made on the maintenance paints used in a food-processing plant. Food acids, combined with the strong caustic solutions required to remove them to keep equipment in conformance with rigid sanitary codes, rapidly destroy the average protective coating. This is particularly true in the citrus-packing industry, where until recently no finish had been developed that could stand up for more than a few weeks. As a result, plants faced costly shutdowns for painting during the height of the canning season.

The experience of the Golden Citrus Juices, Inc. plant at Fullerton, California, was typical of the entire citrus-processing industry. A variety of finishes was tried without success, some failing after the first cleaning, and none able to withstand a full season of use. Two years ago, Willard Carle, master mechanic, undertook to refinish parts of his equipment with chlorinated rubber paints and enamels, using two coats over a primer applied to metal, without any surface preparation other than wire brushing to remove rust and scale.

The finishes not only withstood cleaning without discoloration, but survived a full season without need for repainting or touch-up. In the case of outside structures, such as the giant low-temperature evaporators, the paint remains in excellent condition after more than eighteen months in a location where heavy sea fogs are prevalent and escaping steam from the unit still poses problems of condensation and moisture.

In addition to their use in the plant proper, chlorinated rubber finishes are also used at Golden Citrus Juices, Inc. throughout the engine room. The performance of the special type floor paint in use is unusual. Exposed to heavy traffic and petroleum chemicals, the paint, applied to bare concrete without any special surface preparation, remains glossy and new looking months later.

The ability of chlorinated rubber floor paints to resist the alkalies in concrete and heterogeneous food chemicals has led to their widespread use in food plants of various types. An excellent testimonial to their surface hardness, excellent adhesion, and resistance to chemicals is their performance record on the operating floors at the Amino plant of International Minerals and Chemicals Corp., San Jose, California.

At this west coast plant, the entire operating floor, including aisles, stairways, and a three-foot wainscoting around the 78 by 220 ft area, was painted five years ago. Despite heavy traffic, the constant exposure to the organic acids from the sugar beets being processed into monosodium glutamate, the floor finish remains in good condition after 5 yr.

(For more photos, turn page)

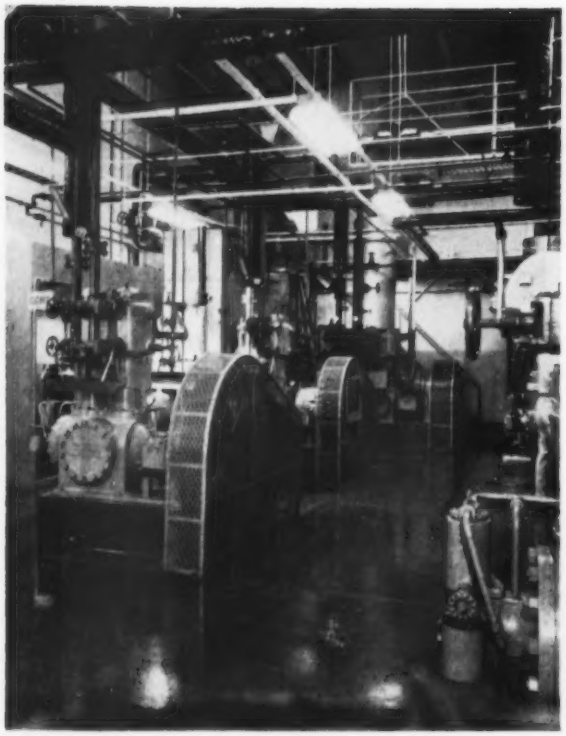


Fig. 5. The engine room at Golden Citrus Juices has been protected in same manner as other parts of plant. Willard Carle, Master Mechanic points out that floor has withstood heavy traffic over a long period of time without damage

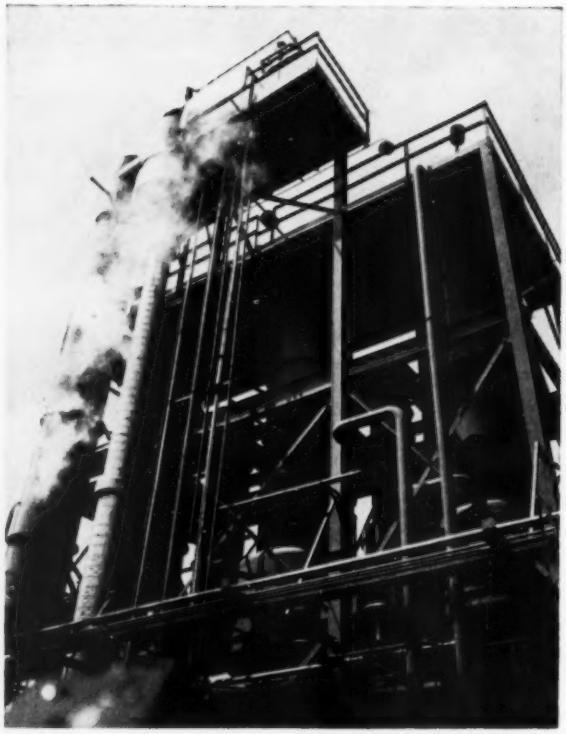
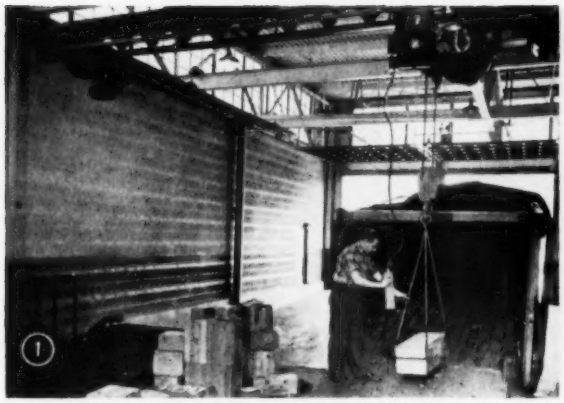
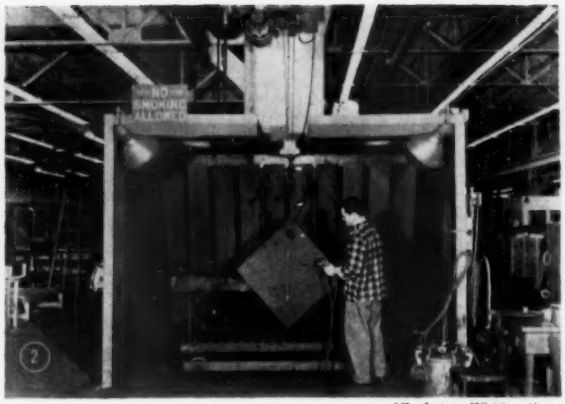


Fig. 6. High vacuum, low temperature evaporators at same plant show excellent condition after more than 18 months' exposure to salt air and caustic cleaning solutions. Finish was one coat of a no-rust primer, two coats of Valdura paint

Fig. 7. View of third operating floor, Amino Plant, International Minerals and Chemical Corp., San Jose, Calif. Aisles, working space, stairways, and wainscoting 3 ft high, are all finished with specially-formulated, chlorinated rubber base enamel. Paint is over five years old. Due to its performance, two other levels of plant have been similarly painted





All photos: Whiting Corp.

OVERHEAD HANDLING Designed for the Future

FLEXIBILITY was the keynote when the Reliance Electric and Engineering Company designed the overhead handling system at its plant in Euclid, Ohio.

The plant is equipped for the manufacture of motor control and electronic regulators, and assembly of these regulators with motor generator sets into packaged control units.

Overhead handling installations, centered at strategic spots in the plant, are designed for easy adaptation in the event of future changes in product or processes. Crane runways have been extended beyond present requirements, and oversize capacity has been written into runway, girder and hoist specifications —all with an eye to possible future production changes.

Efficiency in the present facilities has not been neglected, however. One man can handle most loading or unloading jobs on the shipping and receiving docks; laboratory test units are easily moved to and from test benches; motor storage space has been fully utilized, by increasing available head room; and parts to be painted are moved into the spray booth with little or no manual effort.

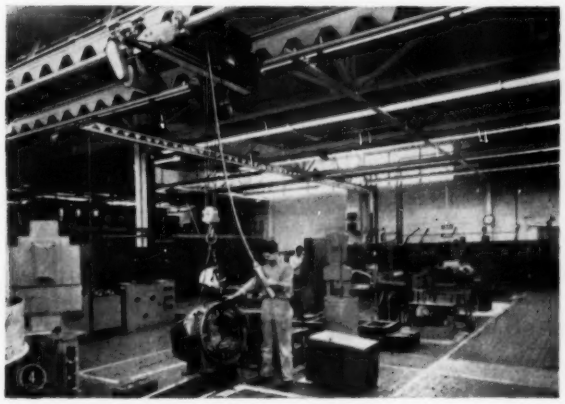
Fig. 1. Overhead hoist with extended rails permits one-man loading of trucks. Extension covers entire truck, adjustable dockboard fits varying bed heights

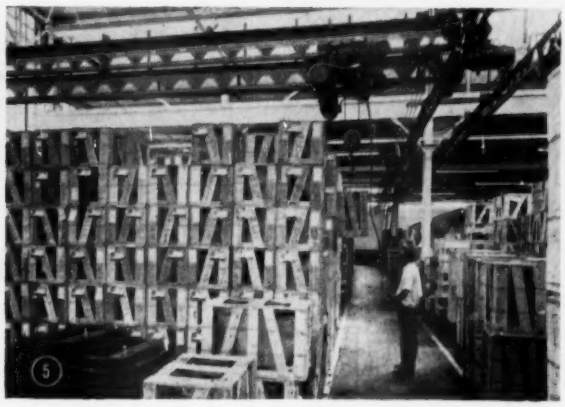
Fig. 2. Overhead hoist services paint spray booth with minimum handling effort by operator. Hood inset permits the centering of hoist and load in booth

Fig. 3. Hand operated half-ton hoist facilitates handling coils of wire. Manually operated interlocks between spur tracks extend area coverage of hoist

Fig. 4. Extra-capacity double girder hoist in engineering laboratory is designed for unusual demands. Pendant push-button controls crane movements

Fig. 5. One of two overhead hoists serving adjacent storage areas. Arrangement provides high headroom, large capacity. Crates go up and over





AUTOMATION DOES IT AGAIN!
Product Handling Speeded at Pittsfield

By C. S. WEST, Distribution Transformer Dept., General Electric Co.

AUTOMATIC TRANSFER equipment designed to handle completed distribution transformers is in successful operation at the Pittsfield Works. The equipment automatically transfers crated transformers from a floor type roller conveyor to an overhead chain conveyor for transportation from the manufacturing building to the shipping warehouse, a quarter mile distant. The transfer is accomplished without stopping the overhead chain conveyor travel.

The transformers leave the manufacturing department completely crated, ready for shipment to the consumer. The crated units vary in size from 18 by 18 by 24 in. to 34 by 36 by 54 in.; their weights vary from 375 to 1200 lbs. Obviously, this variation in size and weight constituted a difficult problem for automatic material handling equipment design.

The utilization of overhead chain conveyors and floor type roller conveyors is common practice in conveying material and equipment in General Electric plants, as well as in other modern manufacturing plants. The transfer mechanism discussed in this article fills the gap between the floor conveyor and the overhead conveyor, doing it automatically in both the loading and unloading cycles. The operating functions, in general, are electrically controlled and hydraulically powered.

The completely crated transformers are propelled from the crating area to the automatic transfer area by means of a power driven roller conveyor. Here, in the transfer area, upon a signal from a photoelectric cell that a transformer is waiting to be loaded on the overhead conveyor, four Micro switches take over.

One of them is actuated when a crated transformer reaches the end of the powered roller conveyor; a second is actuated by the overhead carrier entering the transfer area; a third responds to the pressure of a crated transformer entering the overhead carrier; and a fourth stops the conveyor, should a transformer leave the transfer station riding off-center in the overhead carrier. The sequence of operation of these Micro switches is followed in the text and photographs of this article, describing the movements of one crate.

As the crated unit rolling on the floor conveyor approaches the transfer mechanism, it depresses a roller in the conveyor, thus levering a switch under the roller. This switch (No. 1) stops the roller conveyor and sets the air-operated centering device into operation. As the pistons force the pusher arms against the crate, the crate is forced into the center of the conveyor, and held in this position.

If a crate is on the waiting station immediately ahead of the centering position, the light beam of the electric eye is broken, and the centering device remains operative, holding the crate until the one preceding it has left the waiting station. The absence of a unit on the waiting station restores the beam and the centering device retracts to release the crate. Simultaneously, the roller conveyor is started and the crate is rolled onto the waiting station. Three brake rolls stop the crate as it arrives in position on the waiting station, breaking the beam to repeat the cycle in the centering device from which it came.

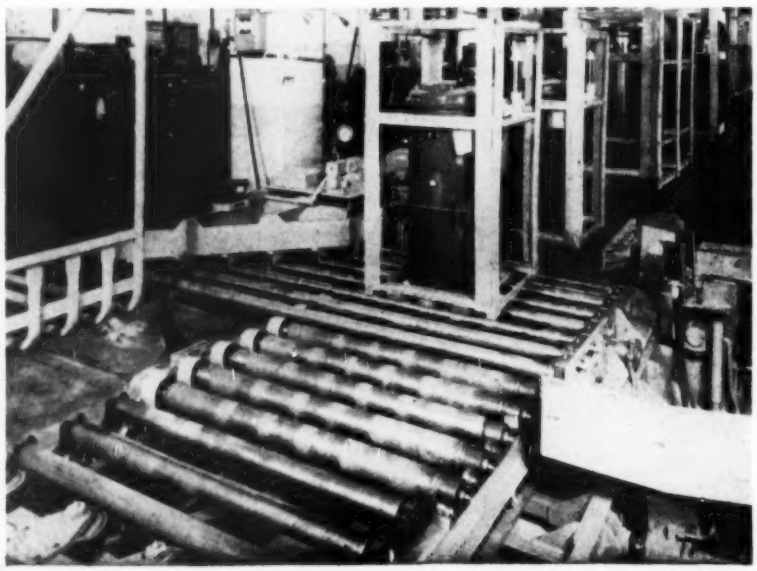
Transfer Car

With the crate on the waiting station, the next impulse comes from the overhead carrier, entering the transfer area. The carrier hanger triggers another limit switch (No. 2) to start the transfer car into motion.

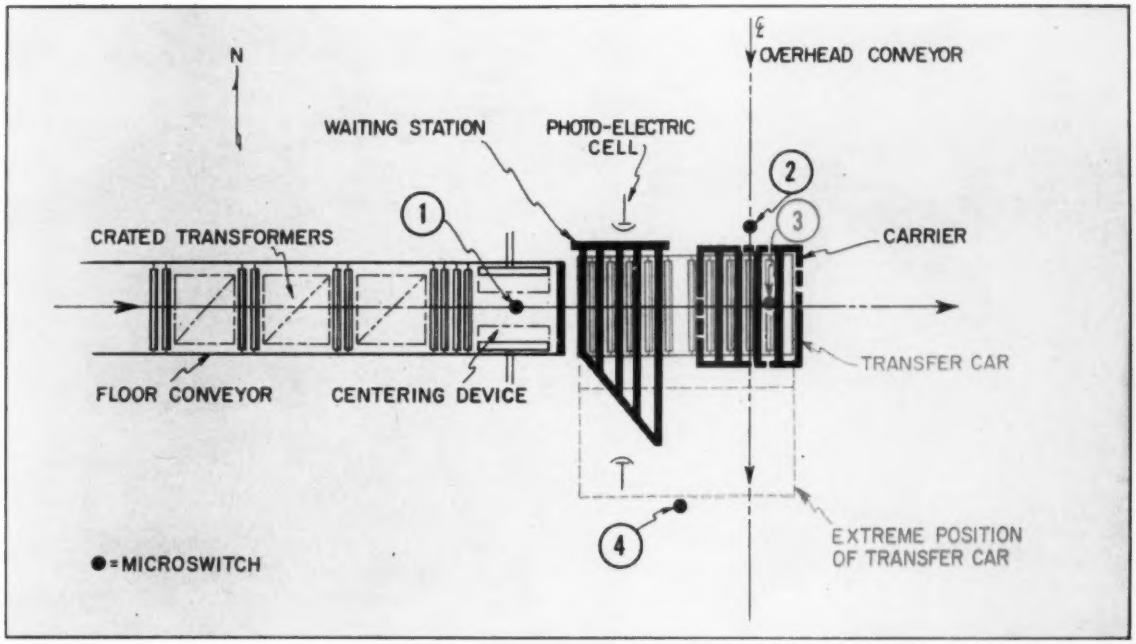
The transfer car is essentially a section of continually running, constant speed, power driven roller conveyor, mounted on a frame that will roll at right angles to the direction of the travel over the rollers. It also can be elevated approximately 4 in., rising above and between the rollers of the waiting station. The rollers on the transfer car are set on an incline of 1/16 in. per foot of travel, and the last three rollers on the car are spring loaded, free-running rolls, each having a limit switch mounted underneath it. These switches are linked so that any or all of them will trigger the desired action. Also, a hydraulic cylinder is installed so that it will move the car for a distance of about five feet, at right angles to the flow from the roller conveyor, parallel to, and at the same speed as, the overhead conveyor.

The overhead chain conveyor consists of specially designed carriers, spaced approximately every 10 feet on the conveyor chain. The conveyor travels at a speed of 15 feet per minute. As the carrier enters the transfer mechanism, it actuates the No. 2 Micro switch. This switch sets in motion the hydraulic circuit in the following sequence:

(a) The transfer car starts in motion upward and continues the full distance of 4 in. During this upward motion, it contacts the crated trans-



Floor conveyor approach to transfer station. Crated transformer stands in waiting station. Transfer car (foreground) is lowered, centering device is retracted



Plan drawing shows locations of components. Transformers move left to right on car, as car moves to extreme position

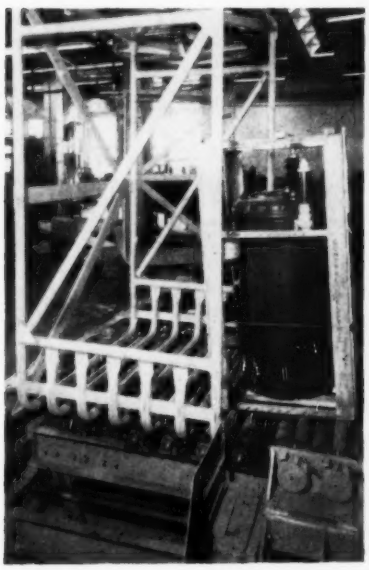
former located on the waiting station. The continually running rollers of the transfer car start the crated transformer toward the carrier.

(b) The car, now fully elevated, by-passes hydraulic fluid through a sequence valve, which actuates the car traverse cylinder. This cycle moves the transfer car in forward motion, at the same rate of speed as the overhead conveyor. This forward motion of the car, along with the cross travel motion transmitted through the rollers, results in the crated transformers travelling in a diagonal direction toward the overhead chain conveyor. This travel continues until the transformer reaches a predetermined point of the carrier. At this point, the incline plane of the transfer car ends; as the crated transformer passes beyond this point, gravity causes the crated unit to right itself.

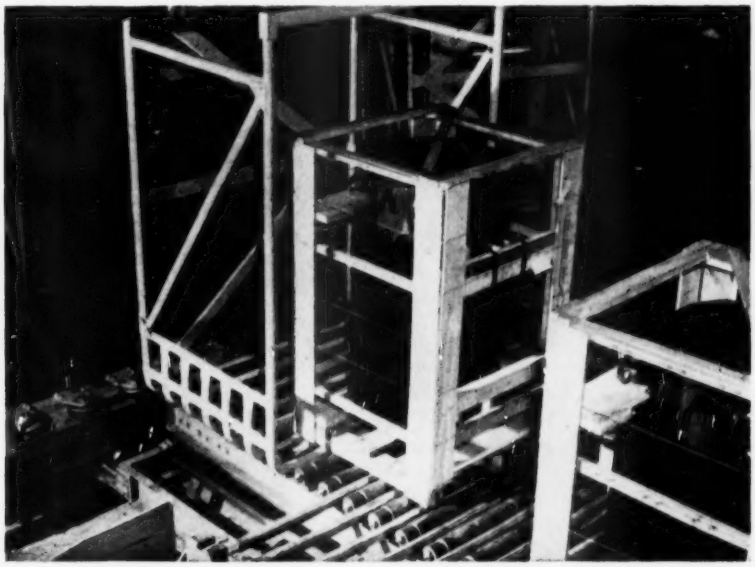
(c) The motion of the crated transformer in righting itself depresses Micro switch No. 3. This energizes a solenoid valve, reversing the elevating cylinder. This cycle lowers the transfer car, depositing the crated transformer onto the bar type base of the carrier, which moves out of the transfer area, to the warehouse.

(d) The transfer car, now lowered to its original starting position, causes fluid to be by-passed through the sequence valve to the return side of the traverse cylinder. This returns the transfer car to its original starting position. It remains in this position, awaiting the next cycle which takes place as the following carrier enters the transfer area.

The unloading mechanism, in principle, is identical with the loading unit except that the operating features are in reverse.



Transformer enters carrier. Three linked Micro switches are under rollers at left



Partially completed transfer. Car has moved with carrier travel, carrying transformer diagonally until it enters carrier. Second crate waits in centering position

Fig. 1. Workmen are seen removing bad lumber from reservoir roof; patches of completed repairs appear in background

KING SIZE Kern River Roofing Job Protects 15 Acres of Oil

ROOFING JOBS come in all sizes but the one that Standard Oil of California undertook seems like the daddy of them all. It consumed an enormous amount of material and was a challenge for the maintenance crew at Kern River. These men came up with a number of time and labor saving devices to take the 15 acre roofing job in stride.

The roofs that were re-covered stretch over three large earthen pits which hold half a million barrels of oil each and measure 530 ft in diameter. Each of these has an area of about 5 acres, making this job one of the largest of its kind on the Pacific coast.

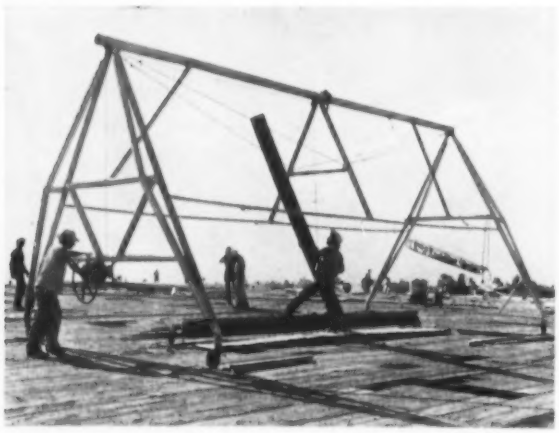


Fig. 2. Winch and cable attached to portable "A" frame made of aluminum pipe aided the men in handling beams

Beams, rafters and sheathing were replaced where necessary after the old covering was removed. The roof surface was then re-covered with one ply of resin sheathing paper, three plies of roofing felt cemented with Petrolastic asphalt and overlayed with asphalt in which stone was embedded.

It was reported that the project required enough roofing paper to form a 3 ft wide carpet from Los Angeles to Fresno—a distance of 220 miles. Enough lumber was used to build 30 five-room houses and approximately 7 tons of nails were expended. To these amounts can be added: 1500 tons of crushed stone 2,500 bbl of asphalt and 6,700 rolls of paper.

For installing angle braces on posts to support the roof beams, a folding portable scaffold, Fig. 3, was built Low seats with wheels, Fig. 4, helped the men in the job of nailing sheathing; a special machine was used for laying roofing material, Fig. 5. Liquid asphalt was brought in tank trucks from American Bitumuls & Asphalt Co. in El Segundo. It was heated to 460 F at the job site and was pumped to the center of the roof where small tank buggies, Fig. 6, picked it up for roof application.

The inventive spirit of the men at Kern River was in no small measure responsible for the completion of the job in 6 mo time. It may be mentioned that during the extent of the roofing job safety was emphasized by daily meetings; the project had no serious accident.

Fig. 3. Angle braces which support roof beams had to be fastened to posts below; this scaffold simplified the task

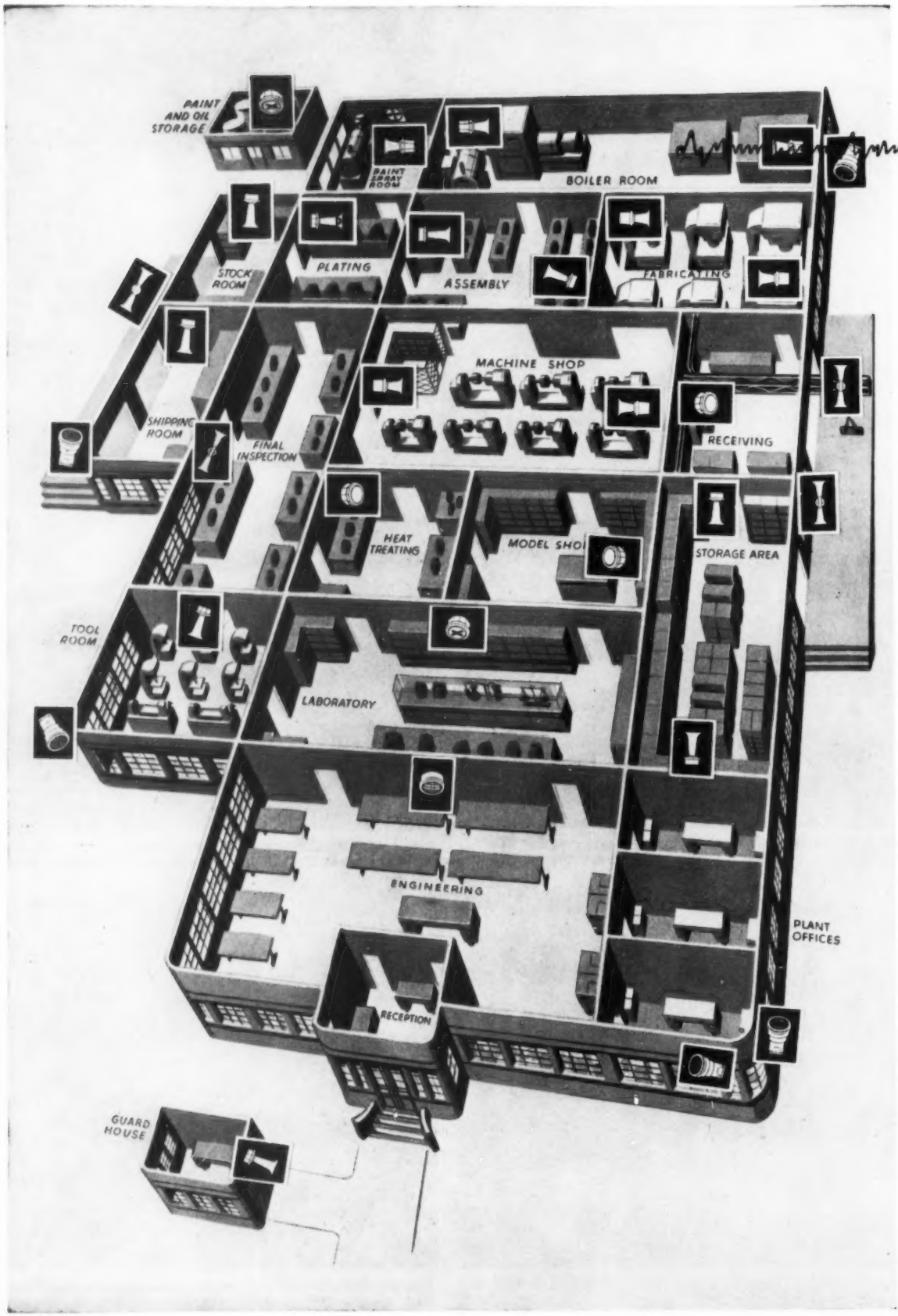
Fig. 4. Four wheeled dollies came in handy for nailing sheathing. The men could move easily as work progressed

Fig. 5. Putting down 6700 rolls of roofing paper is a big assignment but machines like this one cut the task to size

Fig. 6. Small tank buggy is shown being loaded with hot asphalt, pumped through pipe running from the heating point

Fig. 7. Here is one of the portable hopper carts that was used to spread stone evenly after hot asphalt application

Fig. 8. Group of men assigned to roof resurfacing are shown with their worthy helpers, tank buggy and stone spreader


PAINT AND OIL STORAGE
PAINT SPRAY ROOM
BOILER ROOM
STOCK ROOM
PLATING
ASSEMBLY
FABRICATING
MACHINE SHOP
SHIPPING ROOM
FINAL INSPECTION
RECEIVING
HEAT TREATING
MODEL SHOP
STORAGE AREA
TOOL ROOM
LABORATORY
ENGINEERING
PLANT OFFICES
RECEPTION
GUARD HOUSE

How to Use

SOUNDS For SIGNALS

Industrial systems can be bought and applied for practically every hazard or signalling need in industry today. The needs and the surroundings must first be studied and the equipment bought and installed on a planned basis if the ultimate in results is to be achieved. Given here are nine primary points to follow in order to get best job

By **ERIC H. CHURCH**, Chief of Laboratory, Benjamin Electric Co.

INDUSTRIAL SIGNAL system selection consists of much more than the establishment of a comparatively uncontrollable cacophony of sound that will do little else than add to the general confusion. The experience of our laboratory has shown that there are nine steps which should generally be followed if the plant is to achieve maximum results with signal equipment.

In the first place it is necessary to view the entire installation as an entity; this would include a full description of the operations going on at the point where the signal is needed.

Second, outline the purpose of the signal. What is it to accomplish? Is it intended to warn, to time production, to page, or what?

Third, determine the amount of coverage needed and the area to be reached. And fourth, make an analysis of other noises present.

Fifth on the agenda is a determination of whether the installation is to be inside or outside; if it is to be in a wet place or in a dry place; in a location with a hazardous atmosphere. Sixth, determine the type of power available.

Seventh, make a rough plan of the physical layout of the installation. Are there partitions to be encountered or will the installation be made in one large area?

Eighth, analyze the construction at the point the installation is to be made. What materials are used in walls and floors? What is the ceiling height, etc?

Ninth, choose from various types of signals available the ones that will best meet the requirements or needs of each plant situation as determined by the preceding eight steps.

On the facing page we present a drawing of a typical industrial plant with various signal devices indicated; on this page we present a key to the signal systems pictured on the opposite page.

While it can be noted that there are several different models shown on the plant drawing and in the key, they are really variations or modifications of four basic types—the modifications or variations having been made to take care of unusual conditions such as atmospheric hazards, large areas through which the signal must sound, conditions wherein weathering is a factor.

The units shown in place are not, of course, intended as rigid recommendations. They are simply typical applications that would vary depending on other factors such as area, number of employees, etc. Close scrutiny of these and the accompanying key will show the reasons for the selection of the units pictured for their particular area.

Four basic types mentioned above include:

Motor Driven Howlers — These are especially designed for locations where a distinctive sound warning of large volume is required to reach a great area or to cut through loud competing sounds.

Conditions of many plant installations make it unnecessary to have so loud a signal and consequently money can be saved by choosing a less expensive type and one with less volume.

Industrial Siren—This signal is also quite loud and distinctive in character. However, it is particularly suited for fires or other general danger alarm and as a supplement to regular air raid sirens.

Vibrating Howlers—These also give out a distinctive sound with less volume than that of the motor howler or the siren but adequate for many locations with fairly low noise level or in restricted areas.

Industrial Buzzers — These are still lower in price and the sound volume will prove adequate for many locations although the volume is considerably less than the vibrating howler. If the choice falls in an area between the two it is best to pay the slightly higher cost for the vibrating howler.

When the devices are used as warning signals in industrial process work they can be protected with key locks so that the signal can be turned off when the warning is acknowledged. Flashers can also be tied into the circuit to operate visually when the alarm signal is shut down.

Key to Sound Signals Shown on Opposite Page

	Motor-Driven Howler with single bell projector
	Motor-Driven Howler with double bell projector
	Industrial Siren
	Explosion-Proof Howler
	Weatherproof Heavy Duty Howler, single bell projector
	Weatherproof Heavy Duty Howler, dbl. bell projector
	Corrosion-Resisting Heavy Duty Howler
	Non-Weatherproof Howler with single bell projector
	Non-Weatherproof Howler, double bell projector
	Non-Weatherproof Howler projector-less, grille front
	Explosion-Proof Buzzer
	Office and Factory Buzzer
	Heavy-Duty Mine Buzzer

Which Heating System Costs Less — High or Low Pressure Steam?

The author compares equipment costs for operating a heating system with 5, 30 and 50 lb pressure . . . And, answers question: Which operating pressure costs less?

By **WILLIAM W. GAYLORD, Consulting Engineer**

WHEN PLANTS were heated by direct radiation either in the form of cast iron wall radiation or pipe coils and there was no use for steam except for heating the building, it was standard practice to install either cast iron or steel heating boilers designed for 15 psi maximum pressure and to operate the heating system at about 5 lb gage.

Today, unit heaters and fin-pipe radiation have largely replaced cast iron direct radiation for industrial plant heating and as these will operate satisfactorily at higher pressures, there are many reasons that it may be desirable to operate the heating system at higher pressures.

The first reason is that much smaller steam piping can be used and that return piping can be carried overhead and so be out of the way. The second is that boilers with smaller heating surface can be used, as it has been found impractical, due to size of steam bubbles, to evaporate as many pounds of water per square foot of heating surface at 5 lb pressures as at 30 or 50 lb. The third is that somewhat smaller unit heaters may be used.

There may, in some cases, be good reasons for the use of the lower pressure, such as local ordinances requiring a full time operator for all boilers carrying over 15 lb pressure or the requirement that exposed direct radiation be used in some parts of the plant.

Where process steam is also required it will probably be desirable to operate the process equipment and as much as possible of the heating system on the higher pressure and use reducing valves for direct radiation and other equipment requiring low pressure.

Typical Plant

As an example, take a plant having 45,000 sq ft of floor space built in the form of a U as shown in sketch.

For heating only, the maximum steam required per hour will be about 4,500 lb as the building heat loss figure is equivalent to about 15,000 sq ft of direct steam radiation.

The building could be satisfactorily heated by 22 unit heaters of about 165,000 Btu capacity located generally as shown.

If the system is operated at 5 lb pressure, it will require pipe sizes as follows: Section marked A, 6 in., section marked B, 5 in., sections marked C and C′, 4 in. and sections marked D and D′, 3 in. with all runouts to unit heaters 2 in.

If the system is operated at 30 lb pressure, required pipe sizes will be: Section marked A, 4 in., section marked B, 3½ in., sections marked C and C′, 3 in., and sections marked D and D′, 2 in., with all runouts to unit heaters 1¼ in.

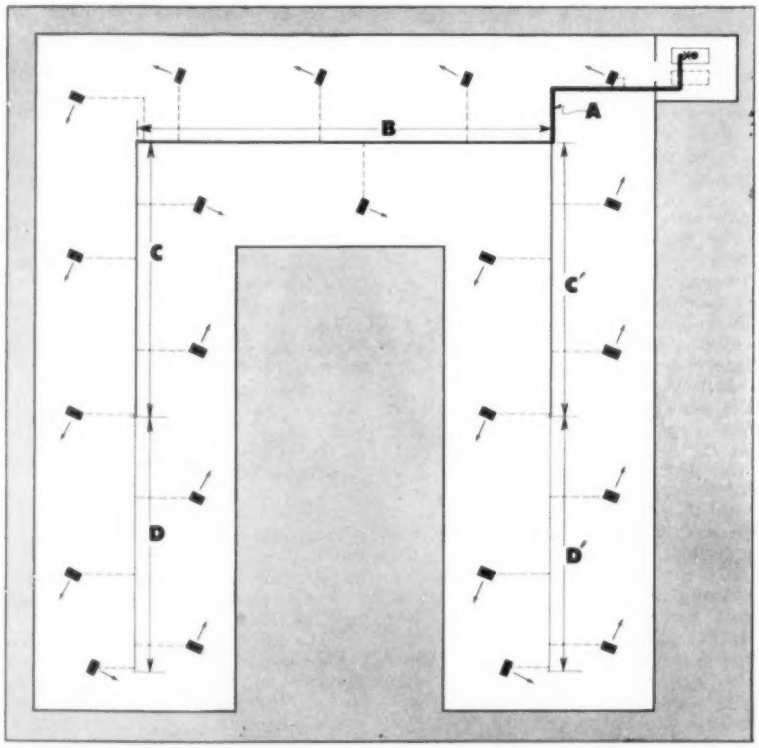
If the system is operated at 50 lb pressure, required pipe sizes will be: Section marked A, 3½ in., section marked B, 3 in., sections marked C and C′, 2½ in. and sections marked D and D′, 2 in. with all runouts to unit heaters 1¼ in.

Boilers designed for 100 psi will have to be used for both the 30 lb and 50 lb systems as this is the lowest design pressure commercially available above the 15 lb system used for low pressure heating boilers. Thus the higher cost of the boilers for these pressures will partially offset the savings in the costs of the unit heaters and piping.

The comparative cost of the three systems, figuring equipment and installation costs only, is shown in the table.

This shows that the cost of the 30 lb system will be about 6.3 per cent less and the 50 lb system about 9 per cent less than that of the 5 lb system.

The higher pressures also have the



Sketch shows U-shaped plant discussed in article. Sizes of piping for the 22 unit heaters situated about the building will vary according to operating pressure

Table shows costs of three systems based on equipment and installation costs only

Installed Cost	Operating Steam Pressure 5 lb	30 lb	50 lb
Boiler, burner and 10,000 gal oil tank	$10,900	$11,700	$11,700
Steam and return piping with valves, traps etc.	4,400	2,600	2,400
Unit heaters	3,750	3,350	3,100
Condensation pump	350	400	400
Electric wiring, including thermostats, switches and controls	500	500	500
Total	$19,900	$18,550	$18,100

advantage that both supply and return piping can be carried above the bottom chord of the trusses where this is desirable.

Where ordinances require a full time attendant if pressures above 15 lb are used, and thus make it uneconomical to use the higher pressures, a considerable saving can often be made by designing to operate at as high a pressure as is practicable with boilers designed for 15 lb maximum working pressure.

In the example given above if the system is designed for a 12.5 lb operating pressure and the controls on the oil burners are set to stop the burner at 13.5 lb and restart it when the pressure has dropped to 11.5 lb, somewhat smaller piping and unit heaters can be used than for a 5 lb operating pressure, and the cost of the system becomes $19,000 or 4.5 per cent less than the 5 lb system.

If the size of the plant should be increased, and this additional space will contain process equipment requiring 1,500 to 2,000 lb of steam per hour, the higher operating pressures would become even more desirable.

It may, however, still be possible to use a 12½ lb working pressure if the process work does not require a higher temperature than 220 F by a careful design of the process piping and steam coils.

The above indicates that a study of the most satisfactory and economical operating pressure for each case should be made before designing a boiler and piping sytem.

Here's a New Angle on Resurfacing

ONE OF THE most unusual and difficult paving operations ever undertaken was the job of resurfacing the steeply banked turns of the high-speed, five-lane track at the General Motors Proving Ground, Milford, Michigan. Two turns have a maximum slope of 77 per cent, the equivalent of a 37 deg angle, and it is so steep that it is virtually impossible to walk up the slope.

An attempt was made in 1944 to resurface the two outside lanes on the banked turns. The job was found to be impossible with conventional paving equipment because of the steep gradient.

After a study of paving equipment with suggested modifications to perform this job, L. C. Lundstrom, head of the Mechanical Engineering Department, made his recommendations.

These recommendations were double-checked by using the equipment on a concrete replica of a section of the turn. They were found to be correct, whereupon work began on the track itself.

First, roads were built adjoining the outside of the three turns. Next, concrete curbs, one foot wide, and two feet underground and one foot above, were installed between the top of the turns and the roads. A tractor, on this roadway, held the finishing machine in place on the steep slope by means of a cable attached to its built-in winch.

The massive roller, weight 11 tons, which followed the machine, likewise was held in place on the slope by cable attached to a specially equipped truck, also on the roadway.

Two means were employed to keep the truck stable against side pull. The truck was equipped with four bogie wheels, actually truck wheels and tires. Two of these wheels rested vertically upon the top of the curb. The others, mounted horizontally under the truck, bore against the outer side of the curb. In addition, on the opposite side of the truck, a counterbalance of two tons of cast iron was installed.

Since the finishing machine is designed for use on reasonably level, crowned roads, changes in the carburetion and lubrication systems of the engine were made to allow operation at an extreme angle. A running board with steps was constructed for the machine so that workers could move where needed. Also, a hopper and conveyor were devised and installed on the tractor to feed the mix to the machine.

Resurfacing the steep slopes of this test track is now possible with special modifications which keep roller and finishing machine on the incline

Heat Does Work in STRAIGHTENING BENT SHAFTS

By JOHN ZOLLINGER, Maintenance Supt., Titanium Div., National Lead Co.

ONE METHOD of straightening a bent shaft was observed recently in our shop, when we received a 4-in. diameter axle, marred with actually hundreds of ball peen hammer marks distributed over its 12-ft length. This method is often used in paper mills where large shafts are used, and very little runout can be tolerated in their operation.

Using drawings that exaggerate the actual bends in shafts the principles of straightening can be explained. It seems to be the common understanding that if a shaft is bent as in Fig. 1, the material along the line A-A has to be elongated to force the curve into a parallel line with the axis. This can be accomplished by peening, no doubt, but it is time consuming and certainly cannot be done to a highly finished piece of work.

Acetylene Torch Replaces Hammer

In the method used in our shop, the principle is reversed, and instead of using a ball peen hammer, we use an acetylene torch. Using the same shaft shown in Fig. 1, heat is applied at the high side of the bend, Fig. 2, concentrating in the center and diminishing toward both ends. The application of heat will further bend the shaft and aggravate the condition. Heating is continued until the bend is twice its original severity. For example, if a straight edge is laid along the concave side of the shaft and we find the greatest depth to be 0.062 in., Fig. 3, we continue the heating until the gap becomes 0.125 in. or greater.

So far in our heat straightening jobs, we have been unable to work out a formula for the length of the first heat, since each problem varies as to size of shaft, length in which a bend must be corrected, and the characteristics of the material. It is safe to start by doubling the initial runout, and finding what the original correction will be. Again referring to Fig. 2 and Fig. 3, assume the stated bend of 0.125 in. The heat is stopped and the shaft allowed to cool, possibly hastening the cooling with an air blast. As the shaft cools the motion is reversed and the shaft rapidly goes past the original distortion of 0.062 in. and may become inactive at 0.015 in. This result provides a basis for calculation to determine the amount of heat to complete the straightening with another heat. Care should be taken that heat is applied quickly but without discoloring the piece of work.

To illustrate the method, a typical case is described, in straightening a shaft driven at 1800 rpm by a direct connected 250 hp motor.

Dial Indicator Measures Runout

The shaft, Fig. 4, is held between centers, and a dial indicator placed under the runout location of the shaft. The shaft is then revolved to place the high spot in the top position. With the runout found to be 0.012 in. total indicator reading, the indicator is set to that figure. Apply heat at A until the indicator goes to 0.012 in. past zero, or more. Stop heat and cool the shaft. If the final reading is not within the desired limits, repeat the procedure, using the new readings. If the indicator should read minus, reverse the treatment, with heat applied on opposite side, to bring shaft back to limits.

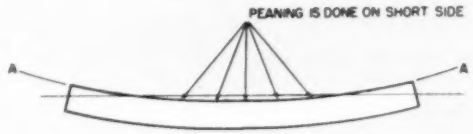


Fig. 1. Peening method of shaft straightening is directed as shown by arrows

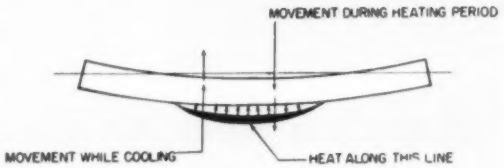


Fig. 2. Heating method focuses on convex side of runout, in center of bend

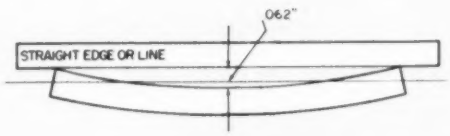


Fig. 3. Straight edge placed on bend provides means of measuring severity

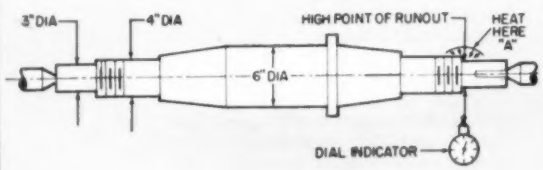


Fig. 4. Arrangement for heat-straightening shaft with bend at shoulder

Industrial Tractor "Sprouts" Crane Now Helps Lift Heavy Equipment

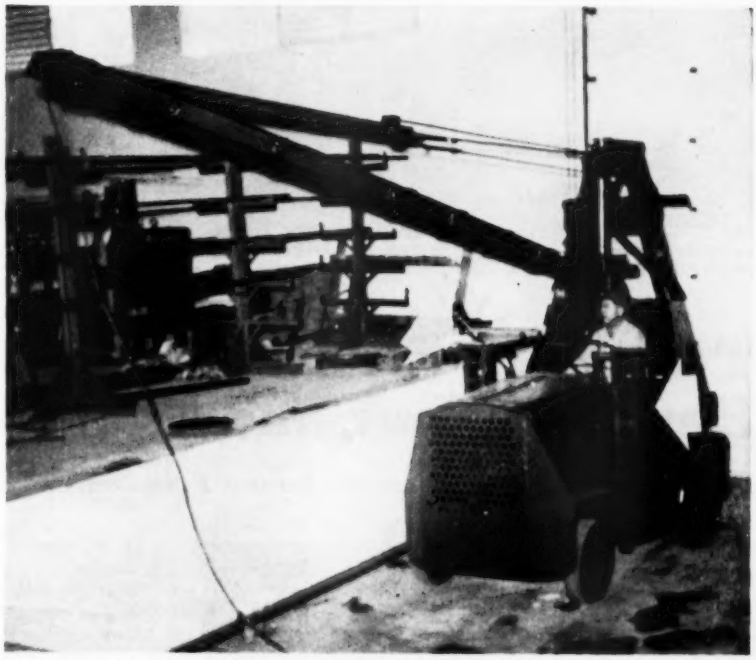
HERE IS AN industrial recipe on how to make that industrial tractor more versatile for plant service. First add a crane to the standard industrial tractor. Then, add a leg and foot-rest attachment to each side of the tractor. And, the result: a hybrid tractor that will do many more jobs in the plant.

This crane-tractor proved very helpful at Giffen Industries, Inc., Coral Gables, Florida, when they recently moved their machine shop equipment to their new plant. It was necessary to remove this equipment from the old plant to make way for the expansion of the company's sheet metal department.

The specially-designed tractor was built in the company shop by R. Z. Reeder, plant superintendent. The tractor is equipped with a crane which was obtained from an Army surplus truck. The crane is capable of picking up two tons and has a 180 deg swing.

Each side of the tractor is equipped with a supporting leg which is lowered to counterbalance the boom when lifting or moving heavy machinery.

In addition to its weight lifting, the tractor can easily push, pull, lift and deliver materials in and out between equipment because of its short wheel base. It also can be used in the yard, moving freight or transferring materials from one building to another.



Full-view of industrial tractor equipped with crane and leg supports on each side. This hybrid tractor now "lifts" in addition to its other accomplishments

Plant superintendent Reeder shows how leg and foot-rest of the tractor operate as a counterbalance to the boom when any heavy machinery is lifted or moved

Another Giffen Innovation

In addition to its ordinary plant duties, the machine shop department makes these film clips from aluminum it regularly salvages

Fig. 1. Left: Attendant connects tube with truck hopper-outlet for unloading bulk sugar for storage or processing. Center: Specially-designed, 12-section hopper-bottom car. Flexible tubes can be attached quickly for unloading. Right: Bags of flour are emptied into hopper connected with pneumatic system. This step completes the manual handling

Two-Way Pneumatic System Handles Flour and Sugar with Ease

By L. G. WELLER, Manager, Airveyor Division, Fuller Company

Fig. 2. Four of the 20 flour and sugar storage silos are shown. Contents are pneumatically delivered and emptied

ALL FLOUR AND SUGAR is handled pneumatically —and contolled by one man—at the world's largest automatic bread and cake bakery, the new Overbrook Bakery of the American Stores Co., Philadelphia, Pa.

Flour and sugar arrive in carload or truckload lots, Fig. 1, left and center, and are conveyed pneumatically into 90-ft-high silos for storage, Fig. 2. When needed, flour or sugar is delivered pneumatically to bakery-floor processing bins.

Specially designed hopper-bottom cars deliver flour to the bakery. The cars, developed by the General American Transportation Co. in conjunction with the Fuller Co., are partitioned into 12 pockets, each with a hopper outlet. Outlets are so designed that flexible intake hose can be attached quickly to them as shown in Fig. 1, center. Cars hold about 120,000 lb each and are unloaded at a rate of 20 tons per hour.

When sufficient quantities of bulk flour cannot be obtained, bagged shipments are supplemented. Bags are emptied immediately into a special bag-dump hopper which also connects with the flexible intake hose as shown in Fig. 1, right. Comparison of this illustration with the two other illustrations in Fig. 1 gives some idea of the savings effected by handling in bulk.

Receiving-to-Storage

From the receiving platform, flour or sugar is delivered into one of 20 silos by a pneumatic system of the vacuum-pressure type. The vacuum side of the system conveys flour or sugar from the carrier into a receiving filter—one of the three shown in Fig. 3. Each handling system has two filters, a primary and a secondary. The primary filter separates flour or sugar from air streams coming from carriers or silos. The secondary filter separates flour or sugar from air streams coming from cyclonic separators atop silos or processing bins.

A positive-pressure type exhauster-blower Fig. 4, creates the powerful flow of air necessary to propel the material through the pipe-lines and into the filter. The filter is of the continuous fully automatic type, in which solids are taken out of the air stream with 100 per cent visible dust retention.

A rotary air lock discharges the material from the filter. From the filter airlock, flour flows (by gravity) through a sifter and infestation destroyer to a second

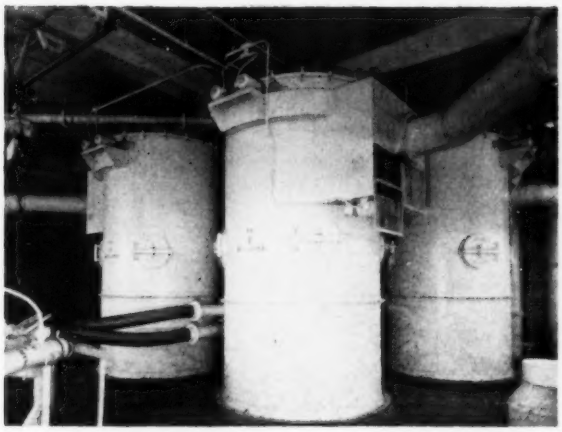


Fig. 3. Each handling system has two filters, a primary and a secondary. Three of the four filters are shown in illustration

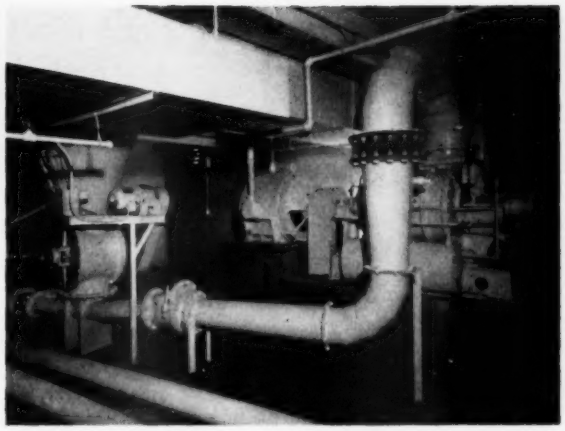


Fig. 4. The exhauster-blower, right, supplies vacuum for conveying the flour or sugar to filter. Rotary airlock at left

airlock which discharges into a blower line. Sugar by-passes the sifter and infestation destroyer and flows directly to the blower-line airlock. Air from the pressure side of the system blows the flour or sugar into the desired silo.

Delivery into the silos is accomplished by means of cyclonic separators located above the bins, Fig. 5. Each separator serves two silos, remote-controlled motor valves directing the flow into the proper silo. Also shown in the illustration is the large remote-controlled pipe-switch (top center) which directs flour or sugar into the proper separator. Exhaust air from the separator is passed through a secondary filter (provided with an individual exhauster) which separates any remaining dust from the air-stream before the air is exhausted to the atmosphere. Filtered material is then returned to the blowing line.

Storage-to-Processing

The filters, exhauster-blower, exhauster, and pipelines mentioned make up one complete pneumatic system which is used for delivering flour and sugar to storage silos. A second similar system is used to deliver the silo contents to processing bins. From the silo, flour or sugar feeds into a vacuum line which conveys it to a filter for delivery through a sifter and infestation destroyer (or by-pass line), into a blowing line.

The blower line delivers its contents to one of the 12 processing bins on the bakery floor. A large remote-controlled pipe-switch, similar to the one in Fig. 5, directs flour or sugar into the proper bin. A twin to the exhauster-blower in Fig. 4 provides the vacuum and pressure for conveying flour or sugar from silo to filter and from blower-line airlock to the processing bins. Air which feeds these bins is passed through a secondary filter (provided with an individual exhauster) before being exhausted to the atmosphere. Filtered contents then return by gravity to the blowing line.

Each of the two bulk-handling systems, designed by our engineers, can be used to unload flour or sugar, in bulk or in bags, from one truck and three car positions and deliver to two groups of 10 storage silos at the rate of 20 tons per hour. Unloading from freight car to storage may be done with both systems simultaneously to obtain a total flow of 40 tons per hour. Each system also can be connected to the truck unloading line, the capacity being 10 tons per hour.

Either system can reclaim flour or sugar from any one of the 20 storage bins and deliver to any one of 12 process bins in the bakery at the rate of 20 tons per hour. This operation can only be carried out with one system at a time. The two systems can be operated to bring flour or sugar direct from carrier to process bins.

To assign either system for any given task, all the attendant must do is make proper pipe-line connections. Fig. 6 shows two flexible lines which can connect either of the two pneumatic systems for sugar unloading (1 incoming line), flour unloading (2 incoming lines) or silo discharge (2 incoming lines).

The entire system is operated by one man. After he makes proper line connections he has only to press buttons on a panel to direct flour and sugar into desired bins. The two systems are interlocked and have signal devices to guard against improper operation.

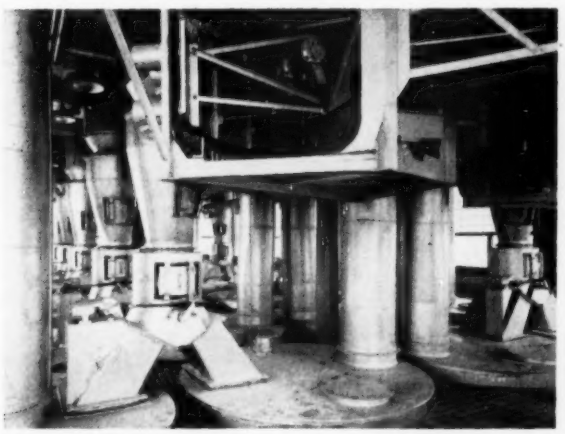


Fig. 5. Motor-driven pipe-switch (top center) diverts flour or sugar into cyclonic separators. Each separator serves two bins

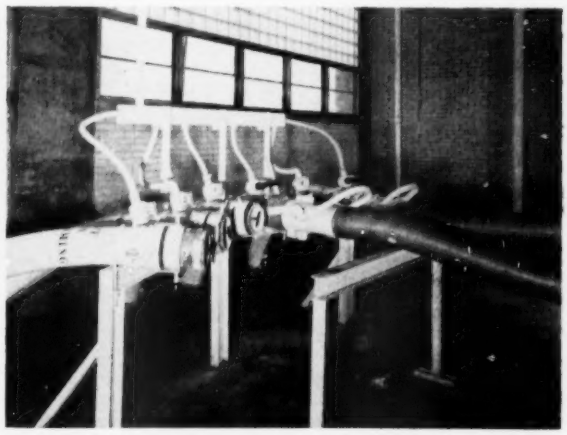


Fig. 6. Either system can be connected to two freight unloading lines; one truck unloading line or two silo lines

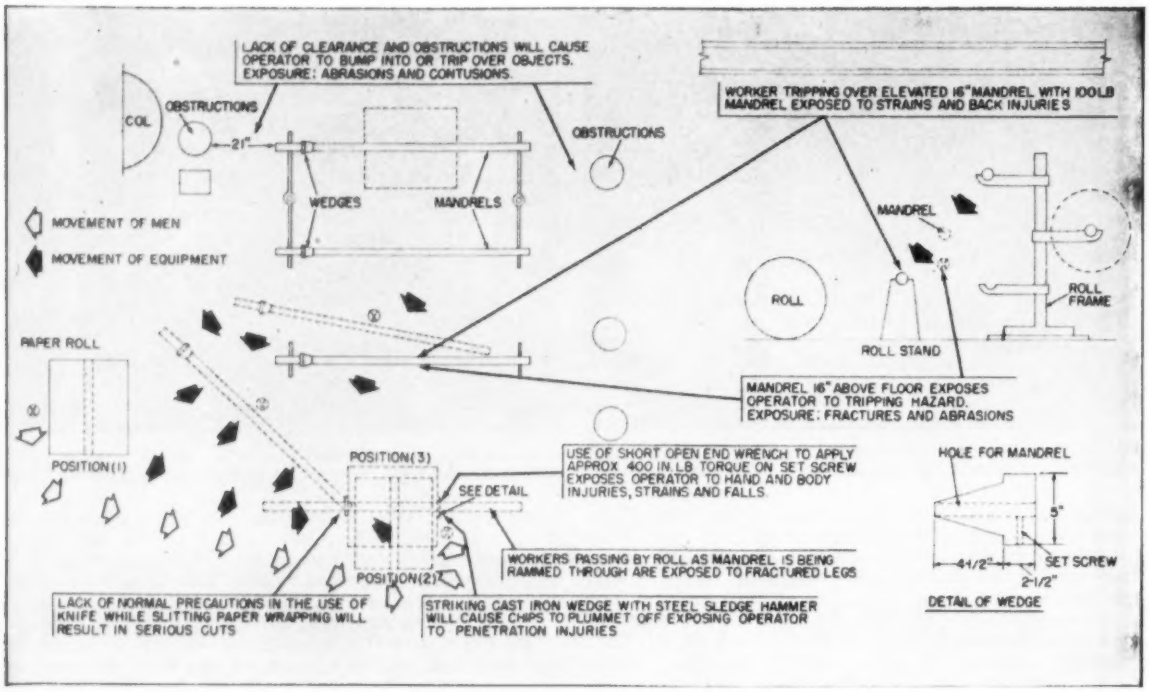

LACK OF CLEARANCE AND OBSTRUCTIONS WILL CAUSE OPERATOR TO BUMP INTO OR TRIP OVER OBJECTS. EXPOSURE: ABRASIONS AND CONTUSIONS.
COL
OBSTRUCTIONS
21"
OBSTRUCTIONS
WEDGES
MANDRELS
MOVEMENT OF MEN
MOVEMENT OF EQUIPMENT
WORKER TRIPPING OVER ELEVATED 16" MANDREL WITH 100LB MANDREL EXPOSED TO STRAINS AND BACK INJURIES
MANDREL
ROLL
ROLL FRAME
ROLL STAND
PAPER ROLL
POSITION(1)
MANDREL 16" ABOVE FLOOR EXPOSES OPERATOR TO TRIPPING HAZARD. EXPOSURE: FRACTURES AND ABRASIONS
POSITION(3)
SEE DETAIL
USE OF SHORT OPEN END WRENCH TO APPLY APPROX 400 IN LB TORQUE ON SET SCREW EXPOSES OPERATOR TO HAND AND BODY INJURIES, STRAINS AND FALLS.
HOLE FOR MANDREL
5"
4 1/2"
SET SCREW
2-1/2"
DETAIL OF WEDGE
WORKERS PASSING BY ROLL AS MANDREL IS BEING RAMMED THROUGH ARE EXPOSED TO FRACTURED LEGS
POSITION(2)
LACK OF NORMAL PRECAUTIONS IN THE USE OF KNIFE WHILE SLITTING PAPER WRAPPING WILL RESULT IN SERIOUS CUTS
STRIKING CAST IRON WEDGE WITH STEEL SLEDGE HAMMER WILL CAUSE CHIPS TO PLUMMET OFF EXPOSING OPERATOR TO PENETRATION INJURIES

Fig. 1. Preliminary study of the potential accident locations in preparing the paper rolls for sheeter roll frame

Procedure for Figs. 1 and 2: 1. Operator went to side aisle and rolled paper to the center of the working area. 2. Dropped turning stick preparatory to turning roll. 3. Turned roll of paper (parallel to final position). 4. Repeated steps 1, 2, and 3 with a second roll. 5. Adjusted the position of the left wedge on the mandrels located on the support. 6. Slit off the ends of the wrapping with a hand knife. 7. Removed the ends of the wrapping from the two rolls. 8. Removed wrapping from around the two rolls. 9. Carried the ends of the wrapping to the scrap at the left. 10. Repeated step 9 with the rest of the wrapping paper. 11. Picked up steel bar and pried out the wood plugs in the ends of the two rolls. 12 Removed the mandrel

OPERATIONAL ANALYSIS— A New Tool for Accident Prevention

By MARTIN H. SALTZ, Industrial Analyst

PLANT ENGINEERS and safety engineers are continually faced with the problem of deciding on the approach to be taken in improving the plant's safety record. In most cases they have two basic tools to work with: the past experience (accident analysis), and inspections. In a plant with a newly established accident prevention program, application of these two tools is the most reasonable approach, and usually shows results. As the program progresses, it is likely to become apparent that an additional technique is required in order to counteract the loss in effectiveness of the two basic tools. It was with this in mind that the technique of applying Operational Analysis to accident prevention was developed.

Before introducing the application of Operational Analysis to accident prevention, it might be wise to briefly review the limitations of accident analysis and inspections as a basis for accident prevention activities.

Analyzing accident records, frequency rates etc., is the most direct line of attack on those accident exposures which have proven to be problems in the past. After a while, however, one of several contingencies is likely to develop nullifying the usefulness of accident analysis:

1. The accidents and injury types which are reported do not group themselves into particular categories; in other words, no significant trend develops.

2. The single non-repetitive type of accidents are reported and have resulted in costly injuries. This type of accident cannot be predicted on the basis of past experience.

3. New departments or operations are established for which there has not been time for an accident experience to develop.

4. Although accident and injury trends do develop, the accident causes seem to be diversified and vary from operation to operation. "Cuts and Minor Injuries" may be the largest injury type, but the injury causes may be different for each operation. When the accident is re-analyzed according to injury causes, the trend tends to disappear until its significance is lost.

If trends develop when the accident data is analysed according to accident causative factors, it may be found, for example, that "Improper Material Handling" is the largest single group. An attempt at a single cure-all, such as "employee training," will usually meet with only limited success. Each operation must be considered individually.

Inspections

Inspections, in general, are perhaps the most important class of tools that the safety engineer has at his disposal. Inspections are most effective with regard to fire prevention, structural failure and other catastrophe hazards.

Making a good detailed inspection is an art and it takes a number of years to accumulate the reserve of background necessary to recognize a particular portion of an operation as being hazardous. In addition, there are several conditions, of which one should be cognizant, which limit the effectiveness of inspections:

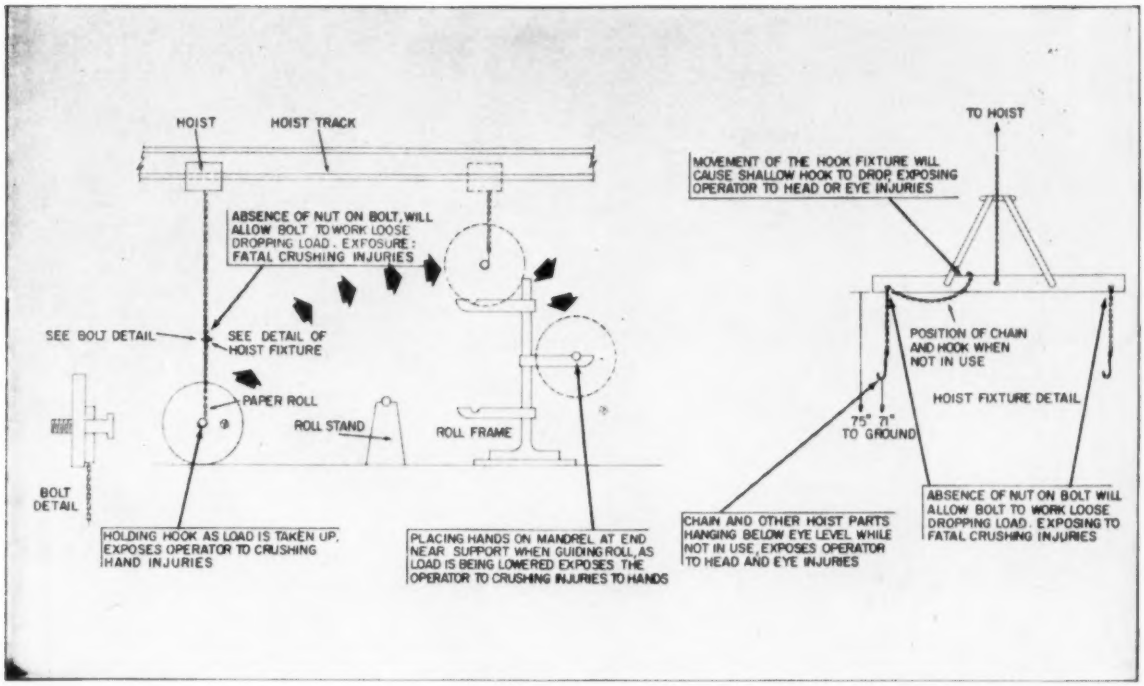

HOIST
HOIST TRACK
ABSENCE OF NUT ON BOLT, WILL ALLOW BOLT TO WORK LOOSE DROPPING LOAD. EXPOSURE: FATAL CRUSHING INJURIES
SEE BOLT DETAIL
SEE DETAIL OF HOIST FIXTURE
PAPER ROLL
ROLL STAND
ROLL FRAME
BOLT DETAIL
HOLDING HOOK AS LOAD IS TAKEN UP, EXPOSES OPERATOR TO CRUSHING HAND INJURIES
PLACING HANDS ON MANDREL AT END NEAR SUPPORT WHEN GUIDING ROLL AS LOAD IS BEING LOWERED EXPOSES THE OPERATOR TO CRUSHING INJURIES TO HANDS
TO HOIST
MOVEMENT OF THE HOOK FIXTURE WILL CAUSE SHALLOW HOOK TO DROP EXPOSING OPERATOR TO HEAD OR EYE INJURIES
POSITION OF CHAIN AND HOOK WHEN NOT IN USE
HOIST FIXTURE DETAIL
75° 71° TO GROUND
ABSENCE OF NUT ON BOLT WILL ALLOW BOLT TO WORK LOOSE DROPPING LOAD. EXPOSING TO FATAL CRUSHING INJURIES
CHAIN AND OTHER HOIST PARTS HANGING BELOW EYE LEVEL WHILE NOT IN USE, EXPOSES OPERATOR TO HEAD AND EYE INJURIES

Fig. 2. Preliminary study of the potential accident locations in loading the paper rolls onto sheeter roll frame

from the tripod support and placed it into one of the rolls. 13. Repeated step 12 with the second roll. 14. Placed wedges on the ends of the mandrels. 15. Drove wedges home with a 10 lb sledge hammer. 16. Tightened the set screws on the wedges with an open-end wrench. 17. Lowered hoist positioning it over one of the rolls. 18. Placed the hooks of the hoist on the mandrel. 19. Lifted roll and moved hoist so that the roll was located over the proper support on the tripod. 20. Lowered hoist dropping roll onto the supports. 21. Repeated steps 17 through 20 with the second roll. 22. Locked the left end of the two mandrels into supports on the tripod. (Data: Paper rolls—33 in. long, 28 in. dia., 550 lb.; and Mandrels—88 in. long, 100 lb.)

It isn't necessary to wait for an accident to happen before you are aware that a hazard exists . . . Here the author explains how to go about making an operational analysis of a job, how to recognize potential sources of accidents by utilizing techniques long recognized by industrial engineers . . . Examples given for specific jobs may be applied, in principle, to other jobs with equally effective results

1. Only those hazards common to operations with which the inspector is familiar can be recognized. This makes complete analysis on a unique or unfamiliar operation difficult, if not impossible.
2. Many hazards are not discernable by an inspector but require rather careful study, or actual work at the job.
3. The identified hazard may not be the underlying cause of the injuries being reported.
4. Inspecting the same premises and operations repeatedly nullifies some of the effectiveness of the inspections. Becoming too familiar with operations leads to a condition where inspections become superficial and, therefore, worse than no inspection at all, in that a false feeling of confidence is developed.

Operational Analysis

In attacking the accident prevention problem on an "operation basis" rather than on an "accident type," "injury type" or "individual hazard" basis, the techniques used in industrial engineering for motion studies and methods analysis are being combined with plant layouts, and flow charts. The application of Operational Analysis to accident prevention has the following features:

1. Applicable on unique operations or processes.
2. Applicable on newly established operations or processes.
3. Applicable before hazards have caused injuries.
4. Forms a permanent part of the record.
5. Suitable for presentation in reports.
6. Suitable for employee orientation.
7. Suitable for discussion at safety meetings.
8. Suitable for bulletin board material.
9. Complete coverage of the plant can be obtained.
10. Results in a "picture" rather than a lengthy report.
11. All of the hazards for a particular operation are revealed simultaneously.

The technique of Operational Analysis, as it is applied to safety work, is a valuable tool which should be used to supplement the work that is now being done in your plant. This technique lends itself particularly to the study of newly established and unfamiliar operations. Transportation and material handling problems are nicely adaptable to this approach as are the "safe jobs," the jobs on which "no one has ever been hurt."

It is amazing how hazards will be disclosed, not discernable by more usual techniques. Once a study on an operation has been performed it becomes a permanent part of the record.

After a series of such studies have been completed they can be put in sequence and will cover a consecutive series of operations until entire processes are analyzed. As operations are revised the studies can be corrected and reissued so that those on file and in circulation will be accurate.

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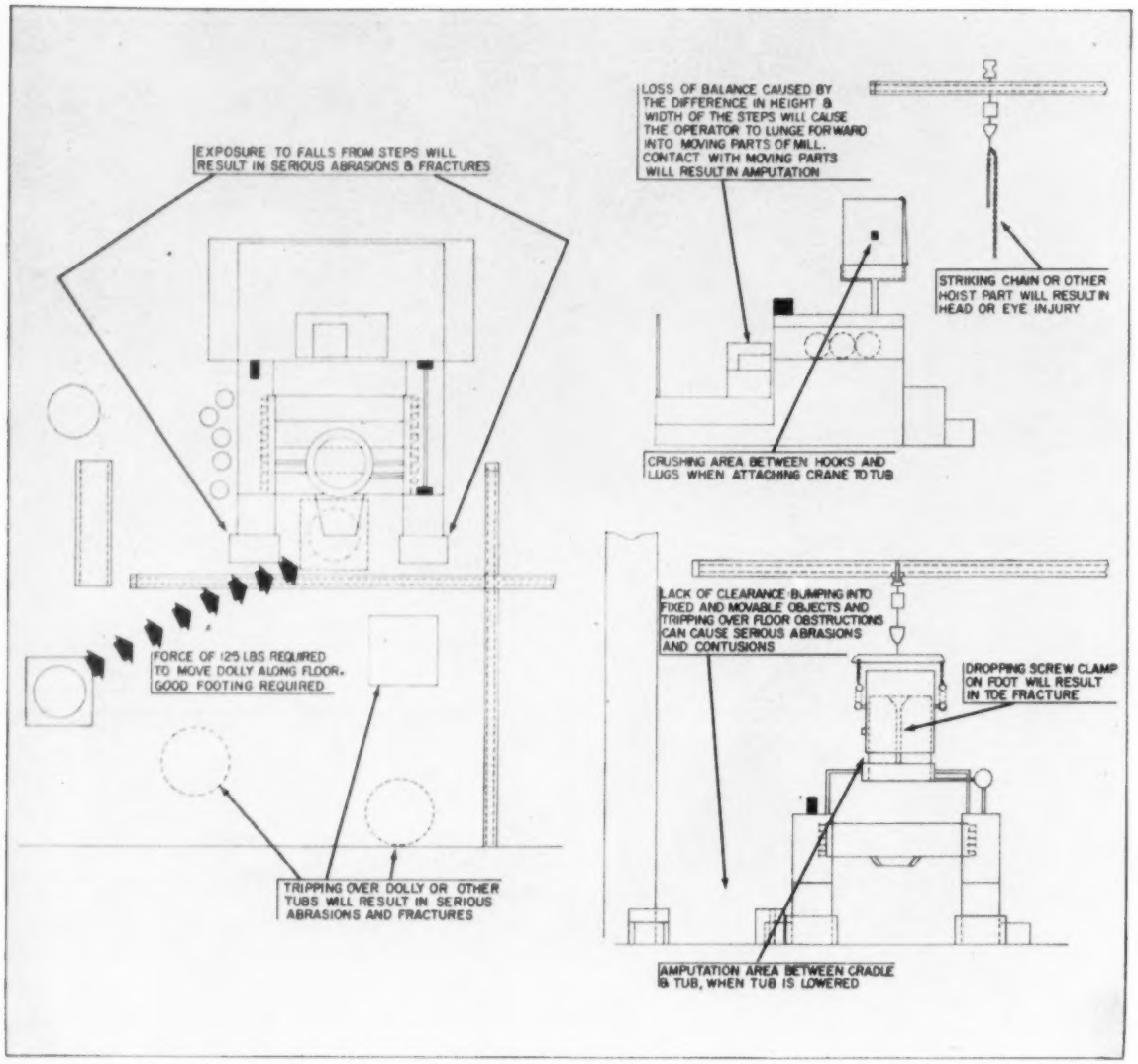

EXPOSURE TO FALLS FROM STEPS WILL RESULT IN SERIOUS ABRASIONS & FRACTURES
LOSS OF BALANCE CAUSED BY THE DIFFERENCE IN HEIGHT & WIDTH OF THE STEPS WILL CAUSE THE OPERATOR TO LUNGE FORWARD INTO MOVING PARTS OF MILL. CONTACT WITH MOVING PARTS WILL RESULT IN AMPUTATION
STRIKING CHAIN OR OTHER HOIST PART WILL RESULT IN HEAD OR EYE INJURY
CRUSHING AREA BETWEEN HOOKS AND LUGS WHEN ATTACHING CRANE TO TUB
FORCE OF 125 LBS REQUIRED TO MOVE DOLLY ALONG FLOOR. GOOD FOOTING REQUIRED
TRIPPING OVER DOLLY OR OTHER TUBS WILL RESULT IN SERIOUS ABRASIONS AND FRACTURES
LACK OF CLEARANCE BUMPING INTO FIXED AND MOVABLE OBJECTS AND TRIPPING OVER FLOOR OBSTRUCTIONS CAN CAUSE SERIOUS ABRASIONS AND CONTUSIONS
DROPPING SCREW CLAMP ON FOOT WILL RESULT IN TOE FRACTURE
AMPUTATION AREA BETWEEN CRADLE & TUB, WHEN TUB IS LOWERED

Fig. 3. Preliminary study of the potential accident locations for the many operations involved for the loading of ink mills

Procedure for Fig. 3: 1. Tub on dolly is pulled to mill. 2. Hoist positioned over tub, hooks lowered and attached to drum. 3. Tub raised and manually positioned over cradle on mill. 4. Tub lowered to cradle. 5. Operator mounts from left steps, disengages hooks. 6. Comes down steps, raises hoist, pulls it away from mill. 7. Mounts front right steps, attaches screw clamp to hold tub in position. 8. Comes down steps, walks to back of mill. 9. Mounts rear platform, starts mill. 10. Comes to mill front, mounts right front steps, turns tilting mechanism handle to empty tub. 11. After tub is empty turns tilt mechanism to set tub upright. 12. Removes clamp holding tub in cradle. 13. Hoist pulled into position, lowered, hooks attached to tub. 14. Comes down steps, raises hoist, pulls tub away from mill. 15. Tub is lowered to the floor and the hooks disengaged.

Performing an Operational Analysis Study

1. Select the Operation for Which the Study is to be Made.

This operation should be one which is repetitive even though the time for a complete cycle may be considerable. The operation does not have to be complete in itself, but can be a portion of a more comprehensive operation. Picking up a piece of stock from a stock pile and feeding it into a machine may constitute a cycle for our purposes even though it is not complete in itself.

In the illustration, Fig. 1 represents a study made at a paper processing plant where the placing of paper rolls preparatory to loading on the machine was considered a complete operation even though it was immediately followed by the actual loading of the paper rolls (Fig.2). When these two studies are referred to consecutively, a comprehensive picture is provided for all the steps taken in locating a roll of paper preparatory to loading, and the actual loading of the paper on to the machine. The decision to make two studies out of this one complete operation was one of convenience, rather than necessity. If the complete operation were included in one study, the resultant drawing would have been too crowded with detail to be of any practical use.

2. Study the Operations in Detail.

List in chronological order, each step taken by the operator in performing his duties. This listing should be detailed and descriptive.

3. Have Procedure Verified by Foreman on the Job.

4. Prepare a Scale Drawing.

The drawing should show the work area, surrounding vicinity, and should include the step by step procedure as written in item 2. Include machines, aisles, permanent obstructions, temporary obstructions, etc. If desirable, also draw a vertical view showing the machines, platforms, head clearance, cranes, etc.

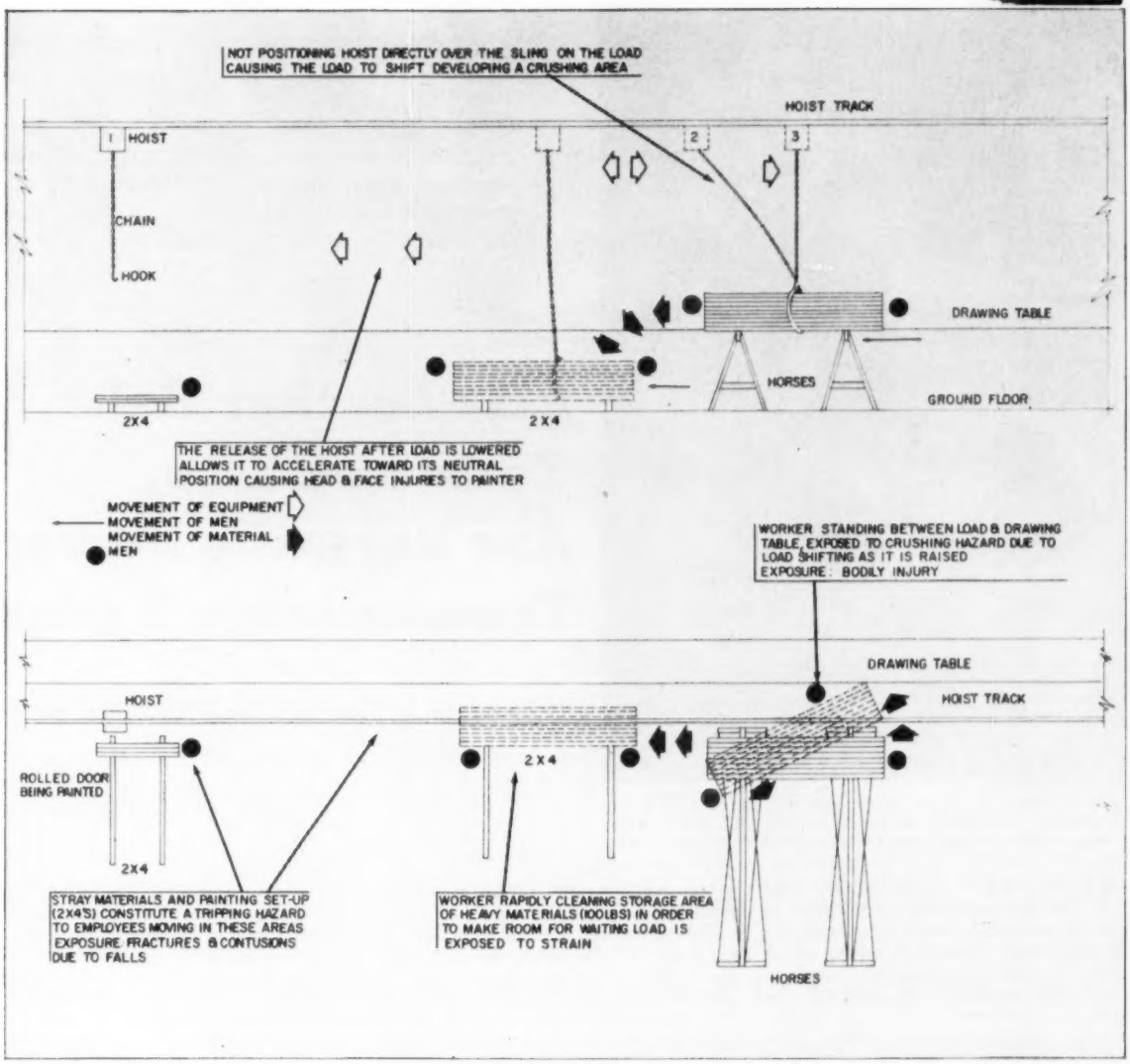

NOT POSITIONING HOIST DIRECTLY OVER THE SLING ON THE LOAD CAUSING THE LOAD TO SHIFT DEVELOPING A CRUSHING AREA
HOIST TRACK
1 HOIST
2
3
CHAIN
HOOK
DRAWING TABLE
HORSES
GROUND FLOOR
2X4
2X4
THE RELEASE OF THE HOIST AFTER LOAD IS LOWERED ALLOWS IT TO ACCELERATE TOWARD ITS NEUTRAL POSITION CAUSING HEAD & FACE INJURIES TO PAINTER
MOVEMENT OF EQUIPMENT
MOVEMENT OF MEN
MOVEMENT OF MATERIAL
MEN
WORKER STANDING BETWEEN LOAD & DRAWING TABLE EXPOSED TO CRUSHING HAZARD DUE TO LOAD SHIFTING AS IT IS RAISED
EXPOSURE: BODILY INJURY
DRAWING TABLE
HOIST
HOIST TRACK
ROLLED DOOR BEING PAINTED
2X4
2X4
STRAY MATERIALS AND PAINTING SET-UP (2X4'S) CONSTITUTE A TRIPPING HAZARD TO EMPLOYEES MOVING IN THESE AREAS EXPOSURE: FRACTURES & CONTUSIONS DUE TO FALLS
WORKER RAPIDLY CLEANING STORAGE AREA OF HEAVY MATERIALS (100LBS) IN ORDER TO MAKE ROOM FOR WAITING LOAD IS EXPOSED TO STRAIN
HORSES

Fig. 4. Preliminary study of the potential accident locations for moving folding doors from the assembly department

Procedure for Fig. 4: 1. Workman places a sling around the load. 2. A second workman then goes to the end of the plant area and pulls the hoist into the vicinity of the load. 3. One of the workmen lowers hook of hoist. 4. First worker hooks hoist to the load. 5. Second worker draws up on the load causing the hoist to position itself over the load. 6. Second worker then operates hoist to lift the load. 7. Workmen push loaded hoist toward the storage area. 8. The load is stopped when it arrives at point of unloading. 9. First worker then clears the storage area of any superfluous material. 10. The second worker then pushes the load to the exact point of storage. 11. Hoist is operated to lower the loads onto supports. 13. The hook is removed by second workman. 13. The hoist is allowed to roll back to its original position on the trolley by spinning action.

In Fig. 1, both plan and elevation views are included. Columns and machinery are shown as permanent obstructions. Other items which happen to be on the floor at the time the study was made are also shown as obstructions.

5. Indicate the Movement of the Operator.

Arrows should be used to indicate the locations taken by the operator within the work area. This is especially important in transportation problems. These locations should be numbered to correspond with the procedure as it was written in item 2. If there is not any appreciable movement, or if movement is confined to a small area, this step can be omitted rather than complicate the drawing unduly.

In Fig. 1, movement of the operator is shown by the shaded arrows, and the positions are numbered to correspond with the entries made in the procedure column. In Fig. 2, which is an elevation view only, no movement of the operator is indicated, since for this operation the movement of the material was more significant. If it were necessary for the operator to ascend stairs, the movement would be shown on the elevation view.

6. Indicate the Movement of the Stock

Arrows should be used to indicate the location of the stock for each step in the procedure written for item 2. This is especially important in material handling operations. If there is not any appreciable movement or if movement is confined to a small area, this step can be omitted rather than complicate the drawing unduly.

In Figures 1 and 2, movement of the stock is shown by the solid arrows and numbered to correspond with the procedure as written for item 2.

7. Indicate Movement Not Included in Steps 5 and 6

Arrows should be used to indicate the movement of the other equipment (cranes, trucks, hoists, etc.) or other employees in the area, if the movement is of any significance.

(Continued on page 218)

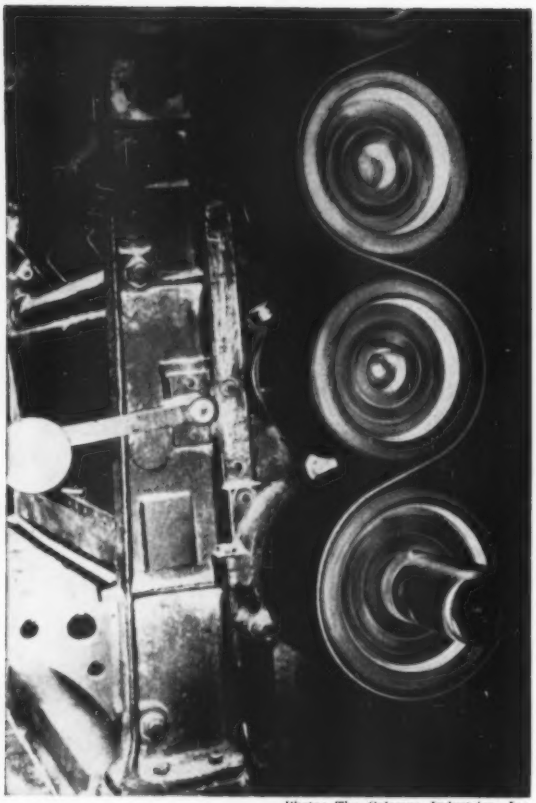


Photo: The Colossus Industries, Inc.

Fig. 1. This five-high crusher roll was fitted with a flat belt drive in order to reduce excessively high maintenance costs occasioned by wear of rolls. Belt now compensates

Drives that absorb machine wear, give maximum service in trying surroundings with high coefficient of friction and extreme flexibility are proving their usefulness in several Louisiana plants

Flat Leather Belts, Tension Bases, Are Versatile Power Transmission Twins

By **FRANCIS A. WESTBROOK**, Mechanical Engineer

VERSATILITY of flat leather belts for the mechanical transmission of power can be illustrated by considering a few highly diversified drives which have a well substantiated record of successful operation in just one section of Louisiana.

One very interesting example is to be found in a cotton seed oil mill in connection with a five-high crusher roll, shown in Fig. 1. These rolls were formerly driven by gears from the bottom roll which was powered by a belt drive from a lineshaft. In addition to being noisy, this drive was expensive to maintain.

When the wear of the rolls made it necessary to grind them the driving gears also had to be re-ground to compensate for the change in diameter of the rolls. This called for a complete dismantling of all the five rolls, naturally an expensive operation which could upset production schedules. It was consequently decided to use the flat leather belt drive as shown.

Diameter of the rolls is 15 in. and their length 60 in. They are driven at each end. Each drive consists of a cast iron lineshaft pulley 15 in. in diameter with a 13 in. face, a fiber pulley on the bottom roll 17 in. in diameter with a 12 in. face and four fiber pulleys on the other rolls 15 in. in diameter by 12 in. face. Each belt is 12 in. wide, two-ply royal chrome leather made endless on the pulleys. A floating type idler pulley swung from the ceiling maintains the proper tension on each of the belts.

This new drive is quiet, costs less to maintain and also saves power. It paid for itself in about two years.

In this same plant the atmosphere is hot, dusty and humid but by properly installing the flat leather belts highly satisfactory performance has been obtained in the cake stripper room where the conditions are particularly unfavorable. One of the drives in this department consists of a 5 hp, 1800 rpm induction motor driving a pump handling the vegetable oil and which is in continuous operation over a long period of time.

The fiber motor pulley is 6 in. in diameter with 4½ in. face and the cast iron pump pulley 14 in. in diameter with 4 in. face, with a distance of only 24 in. between centers. Due to this short center distance and the other adverse conditions in this location, the motor has been mounted on a tension control base. A 4 in. wide two-ply royal chrome leather belt is used, made endless on the job.

Other motors in the cake stripper room are also mounted on tension control bases and in all cases endless two-ply royal chrome leather belts are used. One of the motors powers a modern group drive, employing a 6 in. belt of the same material.

It should be explained that the royal chrome leather belts are subjected to two tanning processes. One of these is the oak tan to provide lateral stiffness and the other is the chrome tan to give maximum flexibility (as for short centers and large speed reductions), higher coefficient of friction, minimum stretch and increased resistance to oil, acid, water, salt, sugar, dust, heat, cotton oil, soy bean oil, etc.

Reasons that this type of belt was selected for use in a cotton oil mill thus becomes obvious. Furthermore these belts, are, due to their flexibility and high coefficient of friction, well adapted for highly fluctuating and shock loads such as are likely to be encountered with the crusher rolls, for example.

Other interesting flat leather belt drives are to be found in a Louisiana rice mill. One of these consists of a 150 hp, 2300 volt, 1200 rpm induction motor mounted on a tension control base. The fiber motor pulley is 20 in. in diameter by 21 in. wide and the split steel driven pulley is 72 in. in diameter with a 20 in. face. A 20 in. endless double-ply high capacity royal chrome leather belt is used. The center distance is only 54 in.

This drive formerly employed a long belt with the motor mounted on the floor on a sliding base. Considerable trouble was experienced by dust collecting on the long belt and causing it to slip. The motor also required excessive maintenance because dust col-

Fig. 2. Modernized ice manufacturing plant has installed this flat leather belt drive to ammonia compressors. Extreme slack in belt gives large arc of contact

lected in the air gap with resultant overheating and burn-outs.

When the mill was modernized the motor was raised off the floor and mounted on a tension control base, to permit of the short distance between centers. Since that was done, about six years ago, no maintenance has been required.

Another typical modernized drive in this plant is for the bag printing press. This consists of a 20 hp, 1200 rpm induction motor on a tension control base mounted on the ceiling. The motor pulley is 7 in. in diameter with a 7 in. face and the split steel driven pulley is 38 in. in diameter with a 6 in. face. Distance between centers is 44 in. A 6 in. oak tanned double-ply, high capacity leather belt transmits the power, the conditions in this case being such that the more expensive royal chrome belting is not required. This drive also has given trouble free service for several years. All drives in the mill have now been converted for tension control motor bases and the use of endless high capacity leather belts with short center distances.

A modernized ice manufacturing plant uses flat leather belts and a diesel engine as its primary source of power. This engine, which operates at 257 rpm, is direct-connected to a shaft with one 72 in. diameter, 12 in. face pulley and one 60 in. diameter, 8 in. face pulley. Both are steel split pulleys. These drive two ammonia compressors, each equipped with 60 in. diameter driven pulleys. The higher speed compressor is driven from the 72 in. diameter pulley and the slower speed compressor from the 60 in. pulley. The distance between centers in each case is 10 ft and each compressor is driven by an 8 in. four-ply endless royal chrome leather belt.

In addition there is a 37½ kw generator driven from the 72 in. diameter pulley on the lineshaft, the belt being under the belt which drives the higher speed compressor, Fig. 2. In this case the speed of the generator is stepped up to 1800 rpm and has a pulley of correspondingly small diameter. The distance between centers is 52 in. and because of the high speed ratio the generator is mounted on a tension control base. Power is transmitted by a 12 in. double-ply endless royal chrome leather belt.

This generator supplies power for motors driving the deep well pump, agitator, storage room compressor, scoring machine, etc.

The belts driving the ammonia compressors operate slack (see arrow) Fig. 2, with the relatively long center distances and speed ratios close to or at unity thus providing maximum arc of contact and making practicable the use of narrower, and less expensive belts. Maintenance has been minimal.

Insulate Joint, Damper Together to Cut Cost

ONE frequently practical but overlooked method of reducing both installation time and cost of materials in duct insulation is to locate the joints and dampers side-by-side and cover both together as a unit rather than separately.

Damper and expansion joint shown in the photo are located on three vertical ducts at the intersections where they receive preheated air at about 620 F and deliver it down through fans to the pulverizers. The regular surfaces of both the vertical and overhead ducts are insulated with one layer of 3-in.-thick mineral wool blocks in 12 by 36-in. sections. The insulating blocks were secured to the ducts with ¾-in. bands on about 9-in. centers, covered with wire mesh, and finished with a ¼-in. layer of insulating cement and a coat of finishing cement.

The standard 12 by 36-in. block sections were easily cut to fit the three sides of the sheet metal enclosure over the damper and expansion joint. While the mineral wool blocks were also secured with bands on the vertical enclosure surface, the smaller insulation sections on the sides of the enclosure are held in place by the wire mesh. The enclosure insulation is finished in same manner as regular duct surfaces.

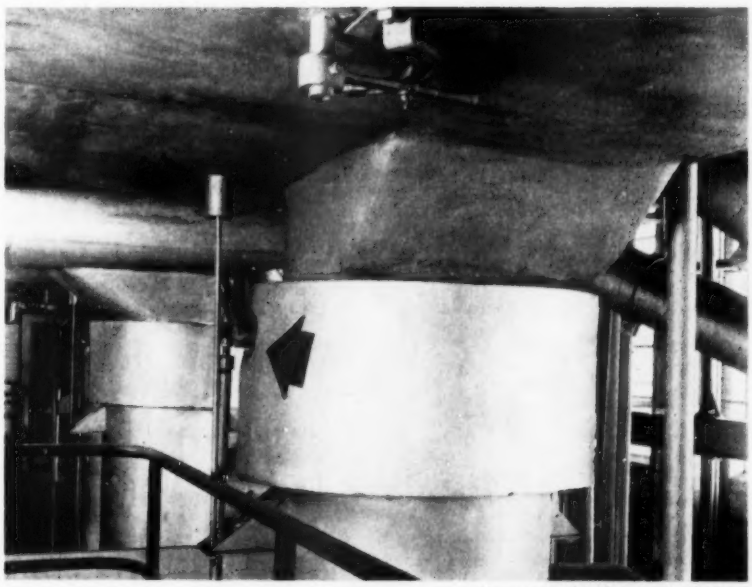


Photo: Industrial Mineral Fiber Institute

Insulating blocks around damper control (arrow) with cement finish beveled

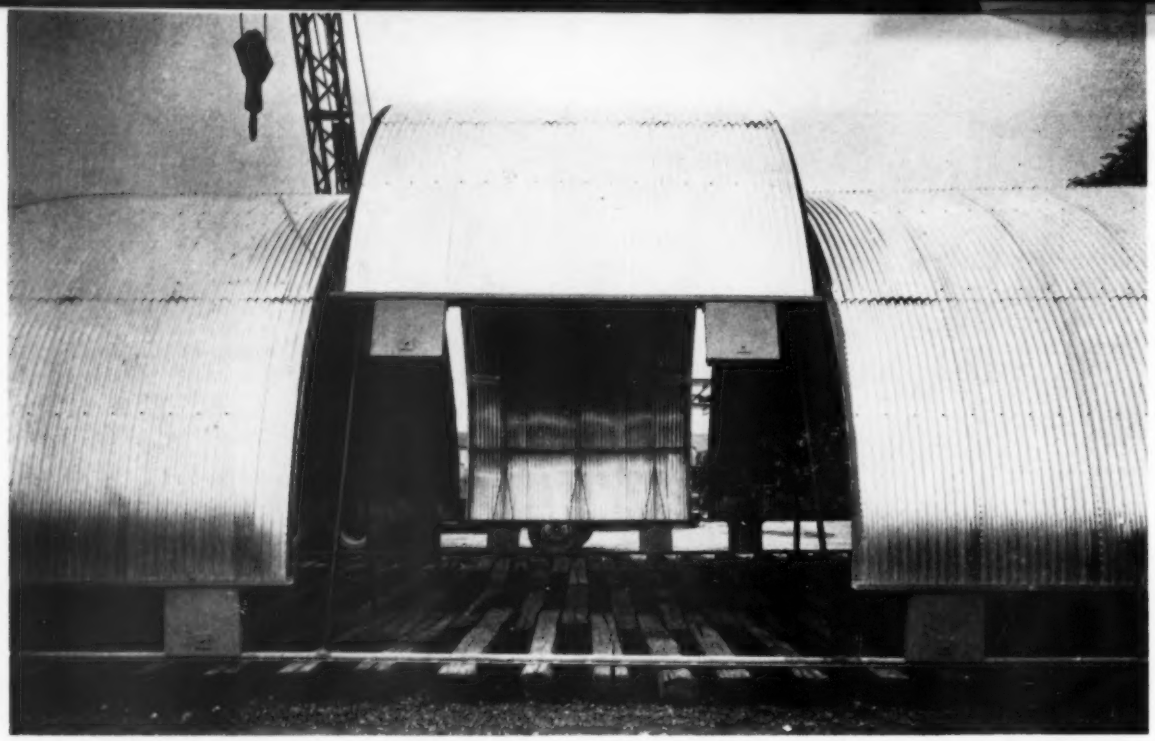


Fig. 1. Here's the building with a section tilted to expose stored equipment or to allow fork truck entrance. Sections are shown here without the skirt which normally encloses the rail and wheel boxes. For heavy machinery storage these 20 in. panels are left off to avoid the condensation that can occur on heavy equipment when stored in closed buildings

NEW STORAGE BUILDING— It Slides, Stacks, Tilts

STORAGE SHELTERS, made up of prefabricated sections which can be quickly erected, are one of the latest boons to industrial plants hard pressed for storage space. These shelters are essentially a series of independent sections mounted on a track to form a building. They may be used as separate sections without a track when advisable.

While not required or suggested, footings and a concrete slab with recessed track may be used. For most applications, however, a pattern of wood ties on a cinder bed is very satisfactory as both foundation and floor, the manufacturer points out. Even here, a plank floor which will recess the track may be laid on the ties if it is needed.

Sections come in five panels, 8 ft by 12 ft. Three men, it is said, can erect one section in one hour with hand tools. The end of the track makes a convenient location of erection of the sections. All that is necessary is to lay down a few planks between the rails for a work area and stand the first panel on end on the planks. It can then be propped in position.

Stand the next panel against it and bolt these two together. Continue in this manner until the five sections are fastened. Next, it may be eased into upright position on two horses while the first two wheel boxes are bolted on. The section is then shifted over and lined up with rails and rocked over until wheels engage the track. The other two wheel boxes are then put in place and lowered to the track.

Once erected the units may be nested at either end of the track.

For More Information

If you want additional information on these units just write the editor about "Yard-Stor." We will forward your name to the manufacturer.

Fig. 2. This photo shows one section removed and nested on adjacent section of storage building by use of crane

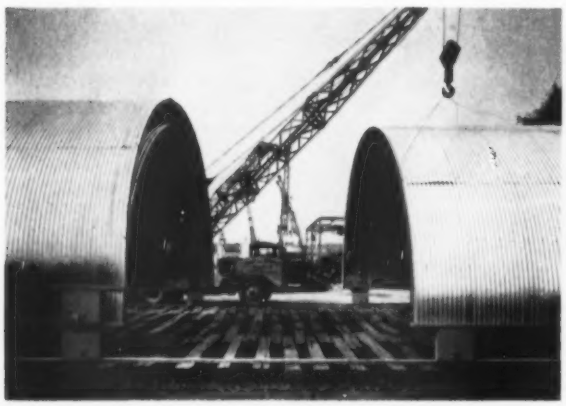


Fig. 3. Here sections are nested to facilitate removal, by truck or crane, of heavy equipment stored in foreground

Plant Engineer's Role In Employee Relations

The author, formerly a plant engineer, is in the unique position of seeing both the engineering and labor relations side of an issue . . . Lessons he learned from this close association at Armstrong are covered in this article

By **EDWARD P. DAVIDSON**, Assistant Director of Labor Relations, Armstrong Cork Co.

FOR YEARS ON END, plant engineers have been living on the technical problems of production. They have eaten their way through the theories and applications requisite to plant expansion, preventive maintenance, routine upkeep, and the many allied subjects. They have seen technological and scientific advances which were not even dreamed of two decades ago. And they have heard our industrial halls reverberating with the sounds of American industry as it pounded its way to ever higher productive goals.

But you, as individuals, may not have been fully aware of a new engineering which was rising around you—that practice which may be called "human engineering." This young but fast growing child of industry has been devoting itself to the scientific approach of not only securing, training, and administering to the people who man our machines, but of providing for these people a healthy industrial environment wherein their energies may be fully utilized in attaining these goals of production. It is here that the work of the industrial relations and labor relations "technicians" comes into play.

Don't Limit Vision

There is a strong tendency for engineers, and as a matter of fact, all line personnel, to concentrate a great measure of their time and talents solely on productive problems. Undoubtedly this is a natural tendency, for the building of a profitable product is the motivating force which governs our industrial enterprises.

But there is also a great danger in limiting our field of vision. Concentrating management solely on production is like asking a doctor to perform an operation by the side of the road. The skill and ability of the surgeon is not diminished in such a case, but the favorable surroundings of an operating room planned and equipped for this purpose can often mean the difference between success and failure. Likewise, favorable industrial surroundings built upon a program of sound employee relations can often become vital to the very life of an industry or business.

I have been privileged to see both sides of this picture, having moved from engineering into labor relations work. The transition from a field of pure science to one combining the arts and sciences is not severely shocking to the thinking processes. But it has emphasized to me the engineer's failure to fully appreciate the value and necessity of harmonious employee relationships in a progressive and successful enterprise.

Certainly this failure does not stem from a lack of willingness on the engineer's part. It is rather the product of a lack of knowledge in handling employee problems, combined with a lack of understanding of the relationship between the human element and the technical tools and machines which they man.

You are all well founded in the use of formulae, mathematics, and technical instruments in solving your problems. Using these tools of your trade, you search for the one correct and specific answer to a particular question. A specific formula for good employee relations would be difficult, for certainly all industry does not follow the same pattern, nor does it adhere to the same policies. But I hope that I can stimulate your thinking along lines which will lead to a sound employer-employee relationship.

Employee attitude is not something you would build in a short time as you would a new warehouse, nor is it purchased in one complete package as is a piece of machinery. It is the end product of a long series of events, changes and programs. Whether it is good or bad depends upon the planning and execution that accompanied management's actions.

It would seem wise to discuss the plant engineer's role from two different viewpoints: first, as a member of management's team; and second, as a direct administrator of the mechanical department.

Probably the one big thing in employee relations is the formulation of a sound industrial relations policy upon which your organization is going to stand. This policy is the guide to each member of management's team in his planning and action, and becomes the foundation upon which employee relationship is built. As long as this policy is formulated upon a premise of mutual understanding, respect, and fair play, the essential groundwork will be sound.

Sound management policies have a long-established habit of gravitating from the top down—seldom, if ever, is this process reversed. And so, whether you participate at the top policy-making level or not, you can certainly lend your thinking and interests toward the achievement of an employee relations policy that is reasonable, sound, and proper.

As a plant engineer, it is extremely easy, and often convenient, to overlook or pass by casually the employee relations problems which confront us daily. We say that employee relations problems are the worries of a production supervisor, personnel, labor relations, or some other function. Yet we consider a production problem a direct challenge to us, and we summon forth all our energies and talents to do battle with it.

I would like to ask you to pause and reconsider this position. Surely you do not possess exclusive rights within your organization to do all thinking about machine maintenance or plant expansion or some other problem which is within your realm of responsibility. Surely the sales manager is not the ony one

About The Author

Edward P. Davidson entered employment with Armstrong Cork Co., in July, 1941, and was assigned to the Millville, N. J. glass plant as a staff industrial engineer. He entered the U. S. Air Force in April, 1942, and upon separation from the service in March, 1946, with rank of major, he returned to the Millville plant.

In July, 1947, he became plant engineer of the company's new plant in Dallas, Texas. At this plant he was responsible for all phases of plant maintenance and engineering, both mechanical and industrial.

In August, 1952, he was transferred to the home office in Lancaster, Pa. as Assistant Director of Labor Relations. In this capacity, he works with numerous plants as consultant to plant managers on all labor relations matters; assists in negotiations with unions, grievance settlements, and arbitration hearings; and serves as advisor to company officials on labor policy, laws and regulations.

interested in an order being shipped, nor is the purchasing agent alone in his worries over a raw materials shortage.

All line functions should share in an understanding and appreciation of all of the problems of the enterprise, and contribute their mutual efforts toward a solution. This is certainly a prerequisite for achieving a spirit of teamwork within an organization, and it is this same teamwork which has contributed so much to our industrial growth.

General Problems Yours

Thus, it would only appear proper that you, as plant engineer, assume some concern over the plant employee problems in general. When you limit your thinking solely to your own department, you greatly narrow the effectiveness of your efforts to promote sound relationships. Include in your planning some thought about the effect of your actions on plant employees in general.

We have made great strides in industry in an attempt to have every administrator and foreman understand the functions of every other representative of management. But this understanding is usually limited to the recognition of an individual's job and its accompanying responsibilities. We have often failed to include in the scope of this recognition the part that employees of each department play in relationship to the unit as a whole.

Usually every action taken by management produces some degree of employee reaction. It would seem logical then that some attempt be made to forecast this reaction before you act and take what steps you can to pave the way for a favorable reception by employees. Here again you should coordinate your efforts with those of other department heads, particularly when their employees will be directly affected. This preliminary groundwork can often avert serious complaints, grievances and misunderstandings.

As Management Man

If your plant is unionized, you can make a valuable contribution to management's representatives. It is of much help to them, particularly during contract negotiations, to know of your experiences under the contract; what parts are difficult to administer; which paragraphs need clarifying to prevent misunderstanding; what items are meaningless or useless. By knowing all your actual problems and experiences in advance, your negotiators can plan steps to improve the overall effectiveness of the contract.

So as a major step toward promoting a better employee relationship, approach this problem with the same spirit of cooperation and teamwork which the management group has exercised so skillfully in many other phases of the operation.

The actions essential to maintaining a good employer-employee relationship extend far beyond policy-making or contract negotiations or broad planning. The success of this program depends to a great measure upon the manner in which it is administered. I am sure that you realize that a plant engineer, through his foremen, can directly control the attitudes, and likewise the extent of industrial harmony, that exists in the maintenance and mechanical departments.

Regardless of whether your plant is unionized or not, there are many basic precepts which will serve you well in promoting a more harmonious and cooperative attitude in your department. It is significant to note that these principles are not derived from some new doctrine, but are solely a consolidation of the primary objectives which we have been taught and have learned from experience for many years past.

Certainly one of the most vital factors basic to your departmental program is your personal attitude toward your employees. Do you issue your instructions in a courteous, clear, and friendly manner, or do you yell, mutter, and scowl? Perhaps the best approach would be to accord to your workers the same consideration you wish to receive from your superiors.

Questions and Gripes

And this same type of reception should be given an employee when he presents questions, gripes, or complaints. Here you should be a good listener, and permit him to explain his problem fully. Even though it may seem petty to you, it is important enough to him to deserve his questioning or complaint. By permitting him to talk fully, you will do much to relieve the tension and pent-up emotion—and you may become better informed yourself in the process.

The investigation and analysis of complaints and grievances is serious business, and may often lead to the discovery of a problem which you did not know existed. Many times the action which caused the employee to blow off steam is not the real source of the trouble. Every effort should be made to diagnose a complaint thoroughly, and seek the proper corrective action desired.

No False Promises

The course of action you take is often not as important to your employees as the manner in which it is undertaken, and the reasoning behind it. Before you make a decision, be sure that you have all the facts and fully understand every aspect of the question. Take the extra few minutes needed to give a full and complete explanation, and be sure that you are correctly understood. And, above all, be sure that once action has been started, or has been promised, it is followed up promptly and carried to completion. Nothing destroys faith more rapidly than false promises.

Discrimination and favoritism can lead to nothing but dissatisfaction, so you should endeavor to always be fair and equitable in the treatment accorded your workers. Your aim should be to earn their respect and confidence, and build for yourself a reputation of fairness and justice in all of your actions and associations.

A well informed supervisor or foreman is the best labor relations asset your department can have, yet he is sometimes completely omitted from the planning and activation

(Continued on page 178)

PNEUMATIC—HYDRAULIC Fluid Power Systems

While the pneumatic and hydraulic systems are best for their respective applications, a combination of the two is the answer to many production problems . . . Such a combination will reduce space requirements, cut cost of original plant equipment, and lower the operating costs

By H. L. STEWART, Special Engineering, Logansport Machine Co., Inc., Logansport, Indiana

WHILE SOME APPLICATIONS lend themselves best to a hydraulic system and some lend themselves best to an air system there are many applications which find best results by using a combination of the two mediums. The rapid fire action of air and the smooth control of hydraulic fluid make an inseparable team in solving many of the production problems which now face us. By using this combination, there will be a reduction of space requirements, cost of original equipment, and operating costs. Many exceedingly difficult problems on shell lines, rolling mills, automobile production lines, and in other production spots have been solved by combining these two fluids.

Let us take a simple air circuit, Fig. 1, which will consist of the regulator, filter and lubricating unit, the four-way control valve and the operating cylinder. For this application let us assume that the cylinder must be able to offer a very smooth feed rate.

To meet these requirements we will choose a combination cylinder. What is a combination cylinder? It actually is two separate double-acting cylinders, one an air cylinder and one a hydraulic cylinder. They may be separate units or they may be built for compactness with the hydraulic cylinder on the front and the air cylinder attached to it with one common piston rod taking care of both cylinders.

The hydraulic cylinder is a closed hydraulic system which does not create any power but does control the feed of the air cylinder. The regulation of the feed is through a flow control valve which is designed for a large range of feeds since these cylinders are often called upon for various speed ranges in a single application. In order to offer versatile cylinders for all applications which come within its scope, they are designed to have the standard movements without adding external valving: flow control on the outstroke with rapid return, flow control on the instroke with rapid outstroke, and flow control in both directions.

Now, by the addition of external valving, various combination of feeds may be obtained. A good example of this is the application of this cylinder to operate the cutoff tool on a lathe. The cylinder feeds rapidly until the workpiece is met, then a cam operated flow control valve is contacted and the tool feeds slowly through the work. At the completion of the cutoff the cylinder returns rapidly clearing the workpiece. By placing several cams along a machine table skip feeds may easily be arranged.

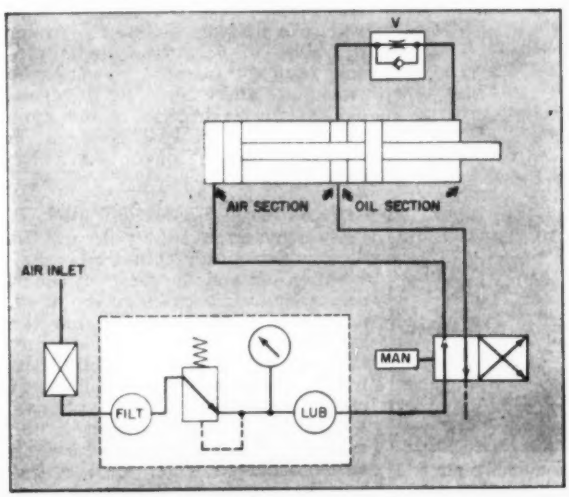


Fig. 1. This circuit finds favor around explosive atmospheres. It is also used to advantage on milling machines, drill presses, induction heating equipment

In order to obtain satisfactory service from a combination cylinder, the closed hydraulic system must be full of oil and the oil must be clean. The one complaint about this type of cylinder is that of "jerky" or uneven feeds. If the operators make sure that the oil cylinders are free from air and full of oil they will have satisfactory results. Automatic oil fillers assure a full oil system.

For Special Needs

The cost of circuit shown in Fig. 1 is less expensive than a complete hydraulic system since it eliminates the power unit. It must be remembered, however, that the maximum pressure delivered is limited by the area of the air cylinder and the air line pressure. This type of circuit finds favor around explosive atmospheres since there is no costly electrical equipment involved. It is used to advantage on milling machines, drill presses, induction heating equipment and other production machines.

With circuit, Fig. 2, using an air cylinder and combination cylinder in a single system, one operator may tend two or more machines without undue fatigue. He may perform the first operation on one machine and the second operation on a like machine. The only work that he performs is to load and unload the workpieces. The circuit operates as follows: operator loads workpiece against center in power chuck, then shifts handle of four-way valve No. 5. Air flows to blind end of tail stock cylinder No. 4, moving piston and tailstock center forward until contact is made with the workpiece. Air pressure is built up which opens sequence valve No. 7, allowing air to flow to the rod end of rotating cylinder No. 6. The piston of cylinder No. 6 retracts, pulling the drawbar connection to the chuck, causing chuck jaws to grip the workpiece.

The operator depresses electric pushbutton A energizing solenoid B of four-way valve No. 2 which shifts its piston, allowing air to flow to

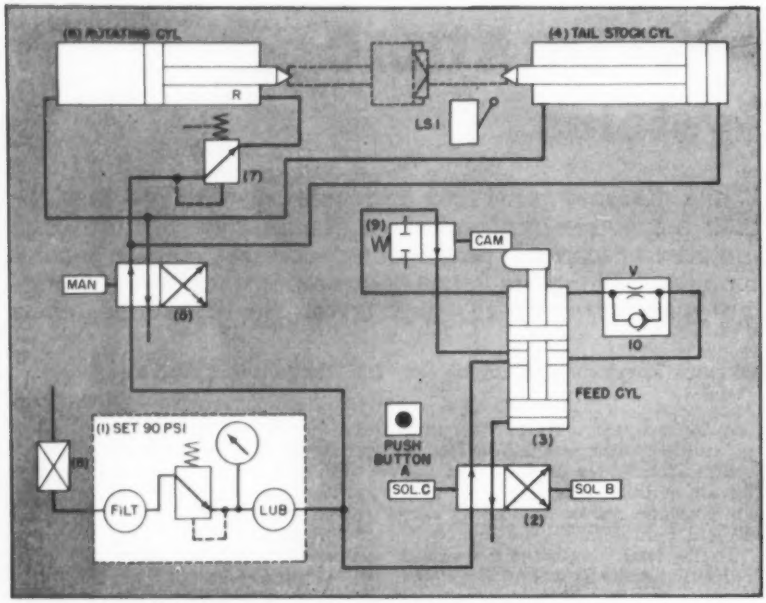


Fig. 2. By using an air cylinder and combination cylinder in a single system, one operator can take care of two or more machines without undue fatigue

the blind end of the feed cylinder No. 3. The piston of combination cylinder starts to advance at rapid rate due to valve No. 9 in closed hydraulic system being open. As piston rod advances toward work, cam roller on valve No. 9 is depressed, stopping oil flow through the valve and a metered flow takes place through the built-in flow control in the enclosed hydraulic system. The speed of the piston of the feed cylinder is limited by the setting of the flow control needle.

As the piston rod of the feed cylinder No. 3 approaches the end of the stroke, limit switch LS-1 is contacted which energizes solenoid C of control valve No. 2, shifting piston of the valve and air flows to rod end of air cylinder in feed cylinder No. 3. The piston returns at rapid rate due to unseating of ball checks in piston of closed hydraulic system.

Operator shifts handle of valve No. 5 which allows air to flow to rod end of tail stock cylinder No. 4 and blind end of rotating cylinder No. 6 thus releasing the workpiece from the chucking equipment.

The rotating cylinder and the tail-stock cylinder respond quickly to air medium while the combination cylinder gives a smooth even feed. When limit switch No. 2 is contacted the machine spindle stops.

With these combination cylinders properly applied to shell machines, production can be greatly increased. The high speed cutting tools can be brought quickly into the work, and the operation performed without any loss to time.

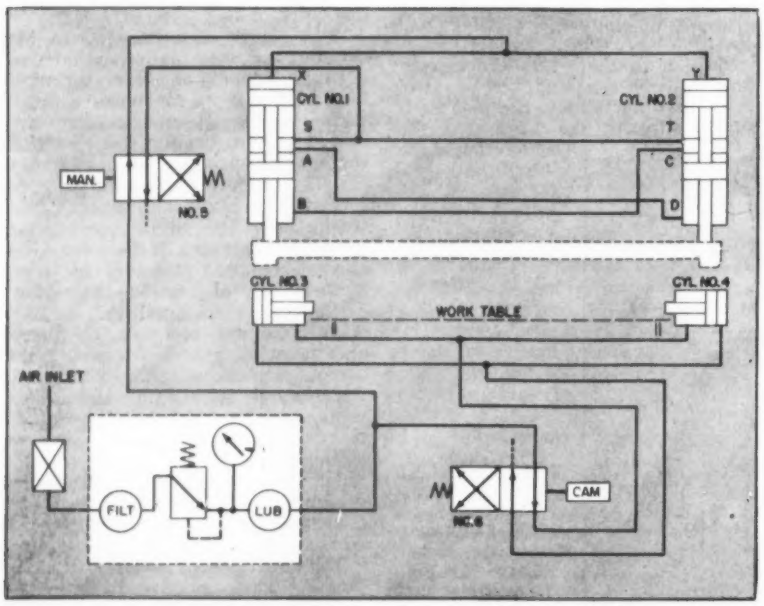


Fig. 3. Synchronization of two cylinders is accomplished by combining air and hydraulic cylinder by cross-connecting opposite ends of closed hydraulic system

Synchronization of Cylinders

This circuit shows a solution, Fig. 3, to a big problem in fluid power—the synchronization of two fluid power cylinders. By the use of the combination air and hydraulic cylinder this can easily be accomplished by cross connecting the opposite ends of the closed hydraulic system. If a complete air cylinder was used it would be practically impossible to obtain perfect synchronization since air is very erratic. When hydraulic is used the method is expensive compared with the combination means.

The circuit function is as follows: Operator loads workpiece onto worktable R. He then shifts handle of four-way valve No. 5 and air flows to ports X and Y of cylinders No. 1 and No. 2 respectively. As the pistons of these cylinders start forward the oil is forced out of port B of cylinder No. 1 into port C of cylinder No. 2 and from port D of cylinder No. 2 into port A of cylinder No. 1. By these lines being crossed one cylinder cannot move ahead of the other.

When the cam on the end of piston rod of cylinder No. 1 contacts roller on cam operated valve No. 6 the air flows to the blind end of clamp cylinders No. 3 and No. 4 and the workpiece is quickly clamped. Pistons of cylinders No. 1 and No. 2 complete their work stroke.

Operator releases handle of valve No. 5 and air flows to ports S and T of cylinder No. 1 and No. 2 respectively and pistons of cylinders No. 1 and No. 2 retract at a rapid rate. As the cam rolls off of roller of valve No. 6 clamp cylinder pistons quickly retract releasing the workpiece and completing the cycle.

The only restriction to this type of circuit is that all combination cylinders must be of the same bore and stroke.

Air, Hydraulic and Combination

By using an ingenious circuit, Fig. 4, in which an air cylinder, a combination air and hydraulic cylinder, and a hydraulic cylinder are used, a multiple pressure system may be set up which is valuable for many testing and pressing applications where pressure must be changed several times during the cycle.

The heart of this circuit is the cam operated relief valve which can accommodate a wide range of hydraulic pressures. The cam plate

which is designed with very little rise is connected onto the end of the piston rod of the combination air and hydraulic cylinder. As the piston of this cylinder advances, the stem on the relief valve is depressed to increase the operating pressure of the hydraulic system.

The combination cylinder can be stopped at any point on its travel by using a three-position master control valve and shifting it into the neutral position which blocks both cylinder ports. Small volume pumps used on the hydraulic power device often cause a slight pressure fluctuation to register on the pressure gauge. This can usually be overcome by the use of an accumulator.

The circuit operates as follows: Operator loads work under die on end of ram cylinder and shifts handle of four-way, two position air valve allowing air to flow to blind end of clamp cylinder No. 12 and work is clamped securely. He then shifts handle of four-way, two position hydraulic valve No. 4. Oil flows to blind end of ram cylinder No. 5 at low pressure. Operator shifts handle of four-way, three position air valve No. 7 and air flows to blind end of air-hydraulic cylinder No. 8. Piston of air-hydraulic cylinder No. 8 starts forward at speed set by flow control on closed hydraulic circuit. On this cylinder, cam on end of piston rod contacts cam roller on relief valve No. 9 and pressure begins to build up in hydraulic circuit. Piston of cylinder No. 5 moves forward at pressure set by cam operated relief valve No. 9. When air-hydraulic cylinder reaches end of its stroke full operating pressure is built up through valve No. 9. Operator has choice of operating pressure by merely shifting valve No. 7 into neutral position anytime during outstroke of cylinder No. 8. Operator shifts handle of valve No. 7 and valve No. 4, causing pistons of cylinders No. 8 and No. 5 to retract to starting position. Operator then shifts handle of valve No. 11 which reverses the piston in cylinder No. 12, unclamping the workpiece.

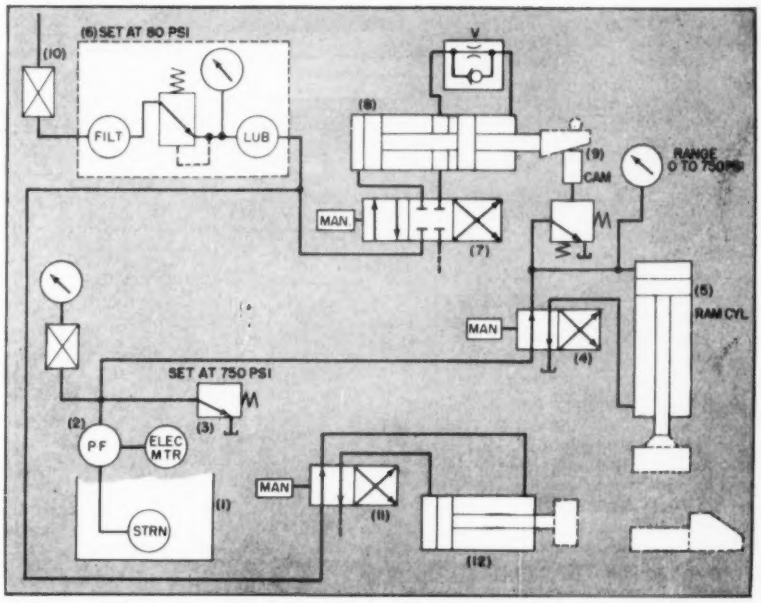


Fig. 4. Multiple pressure system for testing and pressing applications consists of air cylinder, combination air and hydraulic cylinder and hydraulic cylinder

Hydraulic Intensifiers

Air operated hydraulic intensifiers, Fig. 5, have applications in the testing field where various static tests are conducted. The hydraulic side of the intensifier may use either oil or water as the testing means and must be designed accordingly.

The big advantages of using air as the motivating means are (1) excessive heat is not generated in the power system as would be the case of straight hydraulics where the high pressure pump would be constantly working against the relief valve during long test periods, and (2) the elimination of expensive pumping equipment. High pressure pumps and related equipment are expensive. The piston rod of the air cylinder acts as the intensifier ram.

The circuit operates as follows: Operator loads test piece into holding fixture A and shifts handle of four-way, two position air valve No. 1 and air flows to blind end of single acting clamp cylinder No. 4 and piston moves forward clamping test piece securely in fixture.

When pressure builds up in line sequence valve No. 2 opens and piston of intensifier cylinder No. 3 starts forward. Intensified pressure is forced into test piece and the amount of pressure is registered (6).

At completion of test, operator releases high pressure from test piece and pressure line by opening shut-off valve No. 5. Operator shifts handle of valve No. 1 back to original position and cylinders No. 3 and No. 4 retract and test piece is ready to be removed from fixture.

Filler chamber No. 7 is placed in the circuit for recharging the intensifier on its return stroke. A built-in check valve in the bottom of the filler chamber eliminates the possibility of high pressure fluid from blowing into the chamber. The amount of intensification is depend-

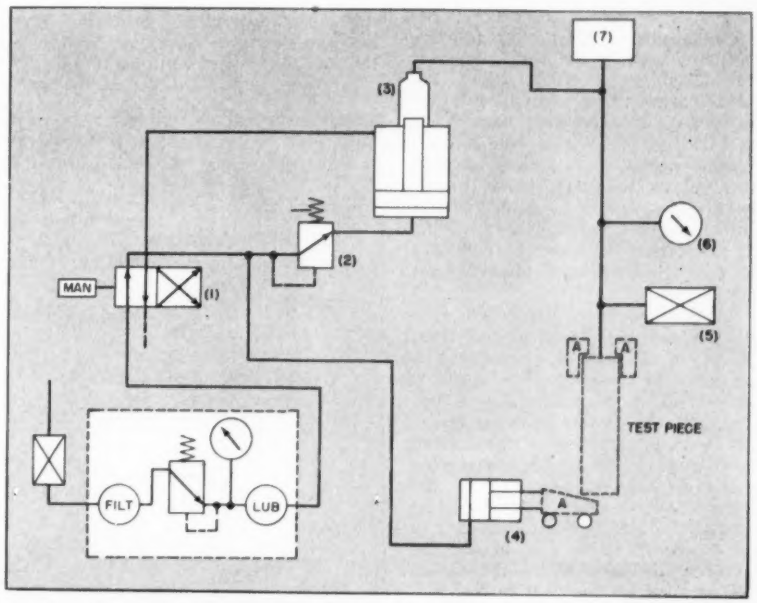


Fig. 5. Air operated hydraulic intensifiers have wide usage in concluding various static tests. Hydraulic side of intensifiers use oil or water as testing means

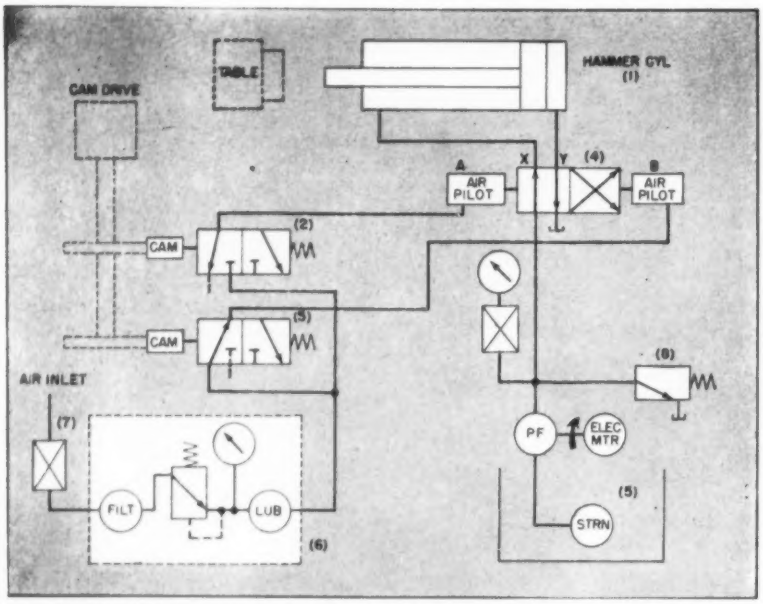


Fig. 6. Air pilot operated hydraulic controls are used for many difficult operations due to the fast response of air in shifting spools of master control valves

ent upon the ratio between the air piston and the hydraulic piston.

Difficult operations have been solved by the use of air pilot operated hydraulic controls, Fig. 6, due to the fast response of air in shifting the spools of the master control valves. These air pilots have replaced solenoids in many applications which require a great number of cycles of operation per day. Air pilots are inexpensive, positive in operation and require very little maintenance. The following circuit will show how the two mediums can be used in conjunction with each other to give high cycling.

Operation of Circuit

The circuit performs as follows: Operator loads piece which is to be hammered onto work table and starts cam drive which contacts three-way two position cam operated valves No. 2 and No. 3 alternately. As the cam rollers of these two valves are depressed the air flows very rapidly to each air pilot connection on valve No. 4. When air is flowing into air pilot A it is exhausting from air pilot B and vice versa.

As the spool in valve No. 4 is shifted back and forth the oil flows out ports X and Y alternately to the hammer cylinder. The speed of the reversals of valve No. 4 and consequently of the hammer cylinder depends upon the cam drive. These cam drives which are electric motor driven usually are of the variable speed type. The operating pressure of the hydraulic system is set by relief valve No. 8 and the operating pressure of the air system is controlled by the unit in No. 6.

When operator has finished hammer operation he cuts out cam drive when cylinder reaches top of stroke. In circuits where an exact number of blows are to be performed on each workpiece electrical controls can be used to automatically stop the action. Similar circuits are used in heavy industrial applications where quick, certain responses are a must.

There is a place in hydraulic systems for air operated hydraulic accumulators, Fig. 7. Since air is a highly compressible fluid it is used in the accumulators to store reserve energy, absorb system shocks, and to smooth out pump pulsations. The first use has by far the most applications. When a quick surge of power is needed the accumulator can be called upon to deliver that extra volume of oil.

Another important use of the accumulator is holding work at high pressures for long holding periods. Some applications require that high pressures be held for months without any letup. If the hydraulic pump forced high pressure oil against the relief valve for long periods the system would overheat but by using the accumulator the only time the pump operates is when the system calls for renewed pressure.

Types of Accumulators

There are three types of air accumulators: the piston type, which is shown in Fig. 7, the diaphragm type, and the bladder type. The bladder type is compact in design and can be used for high operating pressures.

The circuit functions as follows: Operator loads workpieces onto large press bed and shifts handle of four-way, two position valve No. 2, allowing oil to flow to top side of press cylinder No. 3. Press ram moves down and platen contacts workpieces. Accumulator is charged and when limit switch LS-1 is contacted the electric motor of power unit is shut off and the energy in the accumulator keeps high pressure against press ram.

If during the holding period there is enough internal leakage in the system either from valve No. 2 or cylinder No. 3 so that the accumulator discharges until limit switch LS-2 is contacted, the electric motor will cut back in and recharge the accumulator.

Check valve No. 5 is placed in circuit so that accumulator will not discharge through the pump. At completion of work cycle, operator shifts handle of valve No. 2 back to original position and press cylinder piston No. 3 retracts and operator is ready for next cycle.

It will be found that the use of the combination of air and oil in a single system will solve many plant requirements.

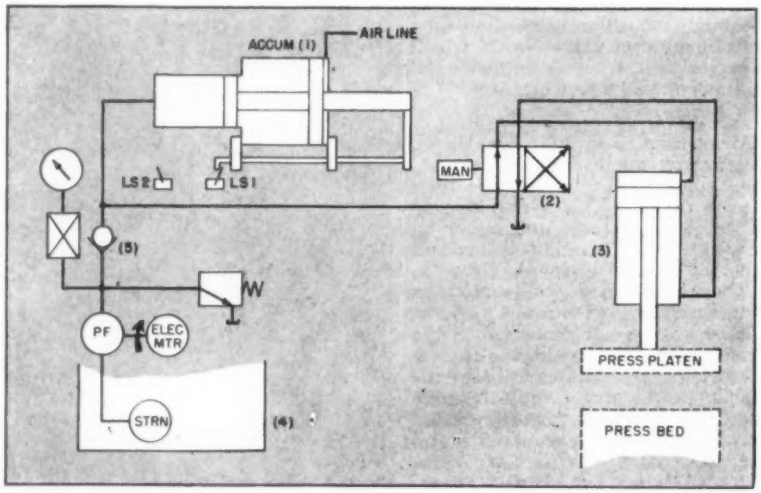


Fig. 7. Air operated accumulators are used to store reserve energy, absorb system shocks and smooth out pump pulsations. Piston type accumulator is shown

Selection, Use And Care of Tools

Scrapers—Various types of scrapers—bearing, gasket, carbon and metal—are useful tools for many jobs in the plant. Author suggests how to select these scrapers and discusses their use and care

SCRAPERS MAY SEEM insignificant as mechanics' tools, but they can prove very useful for a multitude of tasks throughout the plant and thus rank with the finest of conventional tools.

Bearing scrapers, Fig. 1, are actually precision tools, having razor-sharp cutting edges and being hard enough to scratch glass. They are made in various shapes: slightly curved, offset and curved, half-round, or recessed, some being hollow ground. Most bearing scrapers taper toward the point.

These tools can be obtained singly or in sets and come in at least four sizes. They can be used to smooth babbit, bronze or cast bearings. Bearing scraper blades are generally forged from fine tool steel, carefully hardened and tempered, and the shanks are usually fitted with wood handles. The blades of some scrapers are grooved or recessed to provide the cutting edges; others are solid, with the cutting edges being formed by hollow grinding. Half-round scrapers are similar in shape to half-round files.

Flat scrapers are used to impart a smoother finish to flat surfaces than can be obtained with a file. This is possible because they remove less metal and the removal can be confined to limited areas.

These scrapers are similar in shape to flat files, and are generally used in straight or bent end blade types, the cutting action being confined to the end of the blade. Usually the blade is about 1½ in. wide at the end and 3/32 in. thick. Such scrapers are sometimes made from old files, having the teeth ground off and the ends drawn out wide and thin.

Gasket or general purpose scrapers, Fig. 2, are employed to remove gaskets, clean metal surfaces, etc. Scraping blade edges are chisel-shaped and usually come in widths from 1⅛ to 1-7/16 in. Tool lengths vary from about 6½ to 11 in. Some scrapers have steel capped wood handles, while others are made of chrome alloy steel and have plastic handles. These tools are ruggedly constructed and are suitable for heavy scraping of relatively large surfaces.

Solid type carbon scrapers, made for automotive engine use, have many uses in the plant. These tools generally have one straight-edged angle blade on one end and an oval angle blade on the other end, both blades having sharpened edges. This permits scraping of both flat and round narrow surfaces and recesses. The scraper is made in one piece, usually of alloy steel.

Putty knives, Fig. 3, and wall scraping knives are among the most versatile of all scrapers for plant use. These tools are made in a number of sizes, types and qualities, and are especially useful for scraping medium and large areas.

Putty knives usually come in blade widths of 1½, 1-5/16, 1⅜, 1½ and 2 in. They are available with carbon or alloy steel blades and wood, wood and metal, and plastic handles. They can also be obtained with stiff, half elastic or elastic blades. Putty knives usually have square blade edges, but when made especially for automotive use, are available with a chisel edge. One style is made with a bent blade.

Wall scraping knives usually have wood or wood and metal handles. Blade widths range from 2½ to 4 in. by half-inches, and come in stiff, half elastic and elastic grades.

The all-purpose flexible metal scraper shown in Fig. 4 can be used to clean any shape surfaces, since its construction permits it to conform to whatever type of surface it is used on. This scraper can be employed to clean pipe, fittings, threads, solder joints, remove paint from corners and rust from metal surfaces, etc. It will also remove insulation adhering to stranded wires.

The scraper is constructed from high quality, oil tempered, spring steel wire. It has a comfortable, strong tubular handle. An oil pad in the handle keeps the wires free from rust and in good condition, and thus insures uniform flexibility.

The flexible automotive engine carbon scraper shown in Fig. 5 has many uses around plant machinery. Its degree of blade flexibility can be controlled by means of a sliding ferrule (on some models), and this permits it to be readily adapted to different surfaces and various hardnesses of deposits. This type of scraper is usually made of about ten blades of high quality, oil tempered spring steel. Some makes are plated.

One of the most useful tools for cleaning rust, grease and grime from flat surfaces is the wire brush and scraper shown in Fig. 6. This tool permits both scraping and brushing, thus eliminating the need for two separate tools. The handle is metal, and the brush and scraper are renewable. The heavy wire "bristles" are crimped. This permits them to resist bending and breaking. However, straight wire refills are avail-

(Continued on page 182)

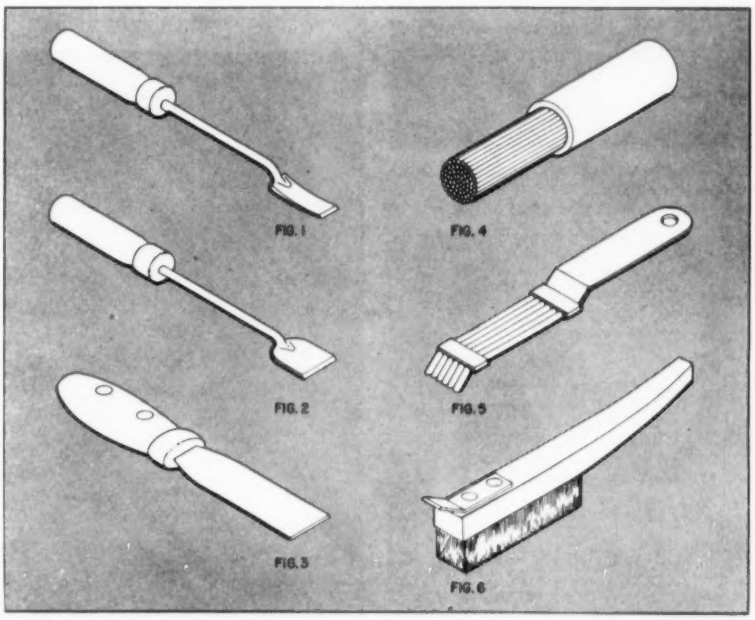


Fig. 1. Bearing scraper; Fig. 2, gasket scraper; Fig. 3, putty knife; Fig. 4, flexible metal scraper; Fig. 5, flexible carbon scraper; Fig. 6, wire brush and scraper

9....

Planned Illumination for VISUAL INSPECTION

By LEONARD V. JAMES, Fellow I.E.S., Illuminating Engineering Consultant

All Illustrations: General Electric Co.

Fig. 1. Superimposing higher level of illumination on the general lighting at difficult task increases area brightness

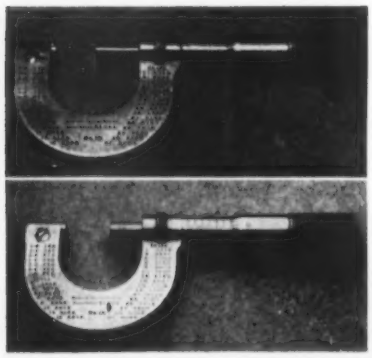


Fig. 2. Above, a small, high brightness source produces a narrow image. Below, results with relatively large source

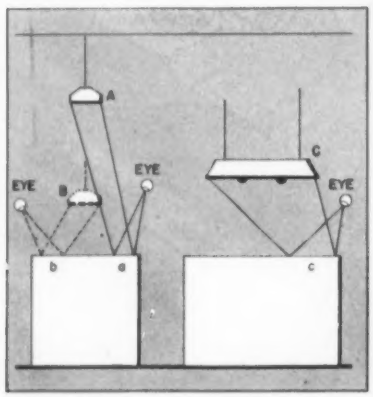


Fig. 3. Applying the principle of Fig. 2 to an imposing stone in a print shop

MOST INSPECTION WORK depends on accurate and rapid seeing. Almost to the point of being boresome, it is feared, this series of articles on Lighting for Seeing in Industry has repeatedly emphasized the four fundamental factors in seeing.

These factors have been shown to be brightness, as a function of the amount of illumination and the reflectance of the material being viewed; size, of the critical details; contrast, between those details and their surroundings; and time, given to or available for the seeing task. The conditions so described are combined with good vision on the part of the workman in providing the degree of visibility required. Favorable environmental brightnesses result in an actual improvement in the worker's ability to see, as well as contribute to his comfort.

While no one of these fundamental factors can be completely disregarded, they are complementary to the extent that a deficiency in one can frequently be compensated for by superiority in others. Since the size and contrast of task details, as well as the time, are often fixed, increasing the brightness by increasing the lighting level is usually a first step in improving the visibility and thus facilitating accurate inspection.

Figure 1 shows a means by which this lighting at the task can be increased to several hundred footcandles for this purpose. The higher level is superimposed on the normally adequate general lighting required for other less exacting work in the area.

In the above case, the overall brightness on the task and of its immediate surroundings was increased. Frequently conditions are such that contrast and therefore visibility can be greatly improved by picking up, in a specular (polished) surface of the task, the reflection of a source of light. This may be the sky when a micrometer is taken to a window, or perhaps a large artificial lighting source of limited brightness.

Figure 2 shows a micrometer in which a broad reflection of such a large source appears in the barrel of the instrument in the lower picture. A narrow and therefore unsatisfactory reflection of a small source is shown in the upper pic-

Fig. 4. A means for accentuating contrasts, indicating faults, by transillumination. The large panel source makes possible a rapid inspection of a large area of surface

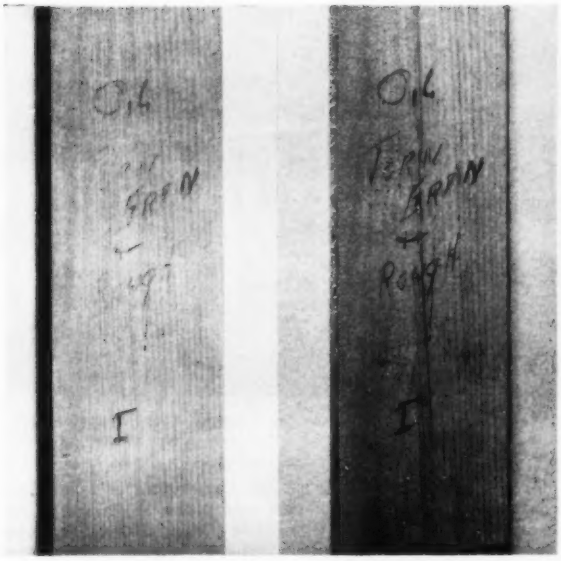


Fig. 5. More or less grazing light from one side will cast shadows at the irregularities in these venetian blind slats

Fig. 6. The principle of Fig. 5 applied in practice to a vertical sheet of metal. Circles indicate flaws in the metal sheet

ture. The advantage of using the large source in increasing the visibility of the scale is obvious.

Another example of this principle is the lighting of a galley or form of type on an imposing stone. The inked face of the type is in contrast with the light colored shoulder or depressed portion of this type. This contrast is accentuated if the shoulder reflects an image of a light source. The printer draws the fixture down over the stone, Fig. 3, not so much to increase the lighting level as to increase the size of this image—to include more type.

The fact is that this source should not be overly bright. It may be a glassteel diffuser or a specially constructed diffusing dome if for incandescent lamps. For fluorescent lamps, it could well be one or more typical industrial fixtures. If more than one, they should be assembled closely beside each other.

Still another application of this principle is shown in Fig. 4. In this case, light from a large source of controlled brightness passes through a parachute or other piece of cloth of fine texture. Any faults are quickly discerned due to the marked contrast thus established.

Creating Contrasts

Figure 5 illustrates a different principle—that of emphasizing surface irregularities by directing light along that surface, thus creating shadows and contrasts which reveal the faults. This same principle is applied in Fig. 6 with a vertical placement of the lamps.

Frequently the above principle of creating shadows in faults can be combined with that of specular reflection, as shown in Fig. 7. When the far end of a cavity is not open, a shielded source can be inserted, Fig. 8, to accomplish the same result. The high value of a transmitted brightness from a lighted panel through transparent or near-transparent objects can be employed to indicate construction irregularities in such devices as a radio condenser by silhouetting the part to be inspected.

Many surfaces can be inspected satisfactorily if they can be even moderately well lighted. For instance, serious faults in a shell wall and any possible foreign matter in the shell can be detected if the interior can be lighted—and also be seen. As a production matter, it is

Fig. 7. The principle of Fig. 5 as applied to an inside cylindrical surace. Light is distributed over the entire surface

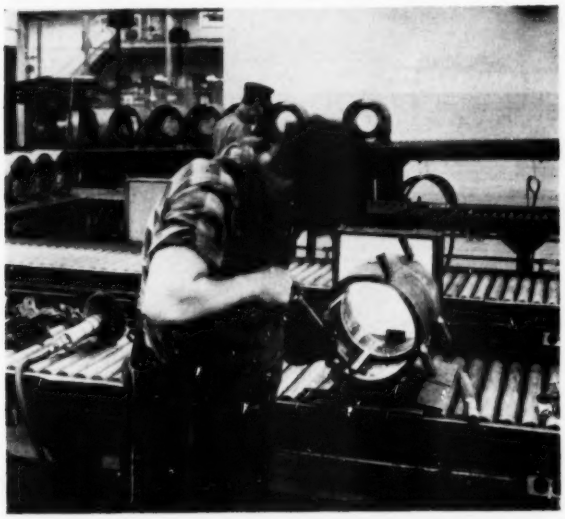
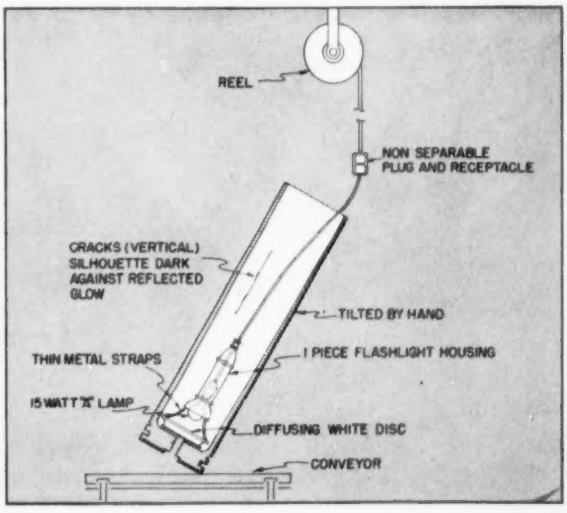


Fig. 8. An effect somewhat similar to that in Fig. 7 can be obtained in closed end cylinder by diffusing light source



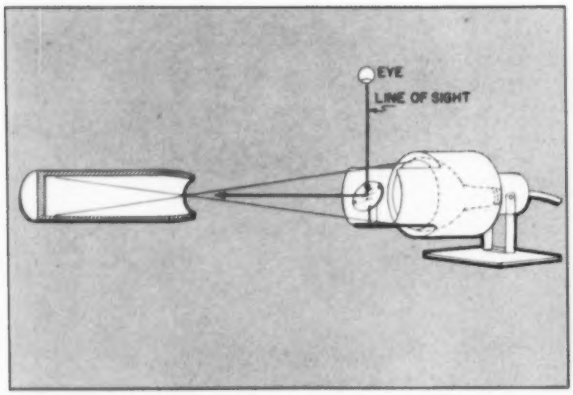


Fig. 9. The presence of foreign matter and major faults can frequently be observed by directing light into the cavity

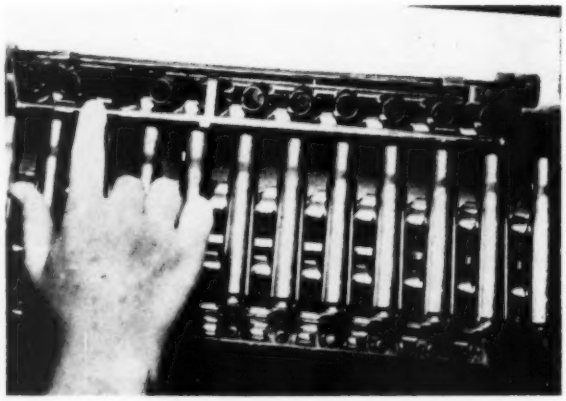


Fig. 10. Inspection of cartridge cases is another application using mirrors to reflect light to critical areas to see all parts

desirable that this inspection be done expeditiously, a condition which is helped if the light source need not be inserted into the shell body.

During the last war, a device was developed, Fig. 9, using a reflector-type lamp and a small mirror. Most of the light in the beam from such a lamp is delivered from the sides of the reflector. The mirror can therefore be placed at the center of the beam, in a 45 deg position, and the observer can thus see all of the shell interior when it is brightly lighted, without cutting off an appreciable amount of light.

Further Use of Mirrors

A further use of mirrors is shown in Fig. 10. The small cartridge cases are illuminated by light from a lamp concealed from view in the hood of the device. This light is delivered directly over the outside of the cases and is reflected into the interiors and over the primer caps by mirrors. The observer sees all of these parts at once. The device is in an inspection line, the cases passing the inspector at the rate of three every two seconds.

In all the instances previously described, the illumination level or brightness of the part being inspected has been increased. Also, in many of these instances, a greater contrast than normal has been provided, by one means or another.

Figure 11 illustrates an inspection device by means of which the apparent size of the detail is increased, by magnification. As a rule, such devices also provide additional lighting of rather a high level, the lamps being concealed at the side of the magnifying lens.

An arrangement for a much greater magnification of small detail is shown in Fig. 12. A filament lamp is here used in a concealed condenser-type illuminator under the table. The filaments are placed in this beam and under the microscope, the image of the filaments being reflected from a mirror onto the screen in front of the operator. In this particular case, the filaments are magnified 100 times. The brightness is controllable by the size of lamp that is employed.

Changing Fundamental Factors

To return to the opening paragraphs of this article, careful observation of difficult visual tasks is made possible by changing one or more of the four fundamental factors of seeing. Means have been suggested for securing increases in brightness, contrast and apparent size. Increasing time, where this is a factor, involves slowing the process. A better procedure than that would be to make such accurate observations possible in the present or even a shorter time by adjusting the other factors.

The reader will understand that the examples used here are representative only. They should suggest possible other uses of the principles involved, in the many cases in his own plant or experience.

Fig. 11. Magnification (plus additional illumination) is an excellent way to increase the apparent size and visibility

Fig. 12. Beam of light is directed through lamp filaments and microscope. Image is reflected on screen by mirror

Here are a dozen suggestions, with detailed instructions, on how you can improve both the safety and maintenance features of your manlifts

MANLIFTS – Some Safety Features of Their Design

By **HOWARD L. STACKHOUSE**, Chief Design and Construction Engineer, General Foods

TODAY'S COMMERCIAL manlift is undoubtedly a development of some early flour miller's experiment in reducing his stair climbing chore. Basically, it remains unchanged—an endless vertical belt carrying steps on which passengers can ride.

Some states do not regulate the installation or use of manlifts at all, and others prohibit their use. Where they are permitted, they are being regulated more and more by codes and periodic inspection. In states where there is no compulsory code, it is well to follow at least the minimum requirements of the American Standard Safety Code for Manlifts as published by the American Society of Mechanical Engineers (American Standard Association No. 190.1-1949).

In addition to code prescribed features, here are a dozen other suggestions that have been developed through experience which will improve the design from safety and maintenance standpoints:

Until recently, over-travel safety devices have usually been provided in just one of the guide rails to stop the drive if a passenger rides past the top landing. However, because the position of the passenger on the step can affect the reliability of the single rail safety, it is better if safeties are installed in *both* of the rails. Some of the newer commercial manlifts are so equipped.

About The Author

Howard Stackhouse has spent 17 years with General Foods, the last six of them as Chief Design and Construction Engineer. Before that he worked for Procter & Gamble. This article is based largely on experience at the Company's Post Products plant where twelve manlifts are in service. Acknowledgement of indebtedness is made to Plant Engineer James B. Stone and Electrical Foreman Douglas Wilson for their assistance in preparing material

Photo-electric safeties have been used, but unless they are conscientiously maintained, they can give a false sense of security.

As a rider can cheat double rail top safeties by putting most of his weight on the handle, an additional safety can be provided in the form of a loosely supported bar of wood, bamboo, or light metal that just clears the step as it starts over the top of the pulley. If for any reason the passenger might be about to go over the head pulley, he would dislodge the bar which in turn would release a safety switch to the "stop" position. This is shown in Fig. 2.

Legal codes usually prohibit bottom landings on the down side so that if a passenger fails to note his position, the rotation of the step around the boot pulley will instantly call it to his attention. Where the down side bottom landing is retained, a good over-travel safety can be built around a bar or board hinge mounted parallel and close to the edge of the step and just below the platform. This takes advantage of the fact that passengers normally ride with their heels projecting far enough to catch and trip such a bar. Figure 1 shows such an installation.

For rider and mechanic safety, a platform is needed at the drive. The clearance above this platform should be adequate to permit a man standing upright on it. Suitable railings and hand holds should be provided so that a rider can get off on this platform even if he has succeeded in riding past the top level rail safeties.

Automatic weight take-ups are always preferable and are, I feel, essential on lifts over seventy-five feet high. Temperature and humidity changes affect belt length and can either cause excessive tension or slippage at the head pulley because of inadequate tension when screw take-ups are used. Excessive tension has resulted in headshaft failures on old style drives and contributes to short belt life by tending to tear the splices open. Weight boxes have been easily substituted

Fig. 1. The bottom landing safety has just been tripped

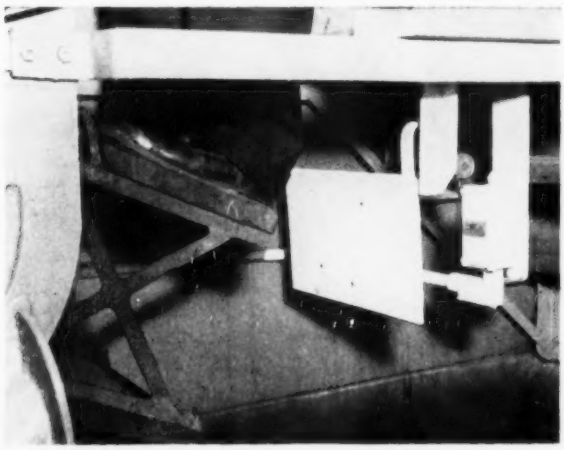
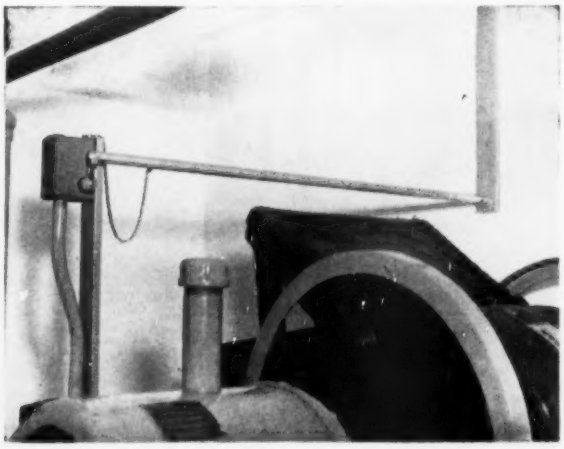


Fig. 2. Lightly supported top safety bar cannot cause injury



for the screws in the normal screw take-up. Figure 4 shows this.

Headshaft failures are unlikely with the drives that are furnished on code designed manlifts and especially where weighted take-ups insure proper belt tension.

Breakage is still possible on some of the older types of drives, and serious consequences can be prevented by providing a sturdy metal cradle surfaced with brake lining under, and just clear of, the head pulley. The cradle serves to both catch and stop the pulley in the event of shaft failure.

In the normal manlift installation, the safety rope operates in the direction of belt travel only. Because there have been instances in which the belt has reversed its normal direction, it is desirable that the safety rope be arranged to stop on a pull in *either* direction. Figure 3 shows one arrangement for doing this.

A ladder should be provided on side of the manlift frame to enable passengers to get off if belt stops.

When precautionary signs are painted on the manlift belt, the recommendation of the belt manufacturer should be used in selecting the paint. Belt life will be shortened by the use of improper paints.

Means are required to prevent a rider from inadvertently grasping the handle *under* a step instead of the one above it. A cup handle that can be seized only from the proper direction is the usual answer, but tools or other objects can be put in these handles and such items can be dropped over the head pulley to injure passengers on the other side. Another solution that has had some limited general use is shown in Fig. 5 where a conventional handle is covered by a free hinged flap of belting or plywood when traveling in the direction from which it should not be grabbed. (Caution: If leather is used it should be so stiff that it can't be tucked into the handle, and should be punched with enough holes to spoil it for shoe soles!)

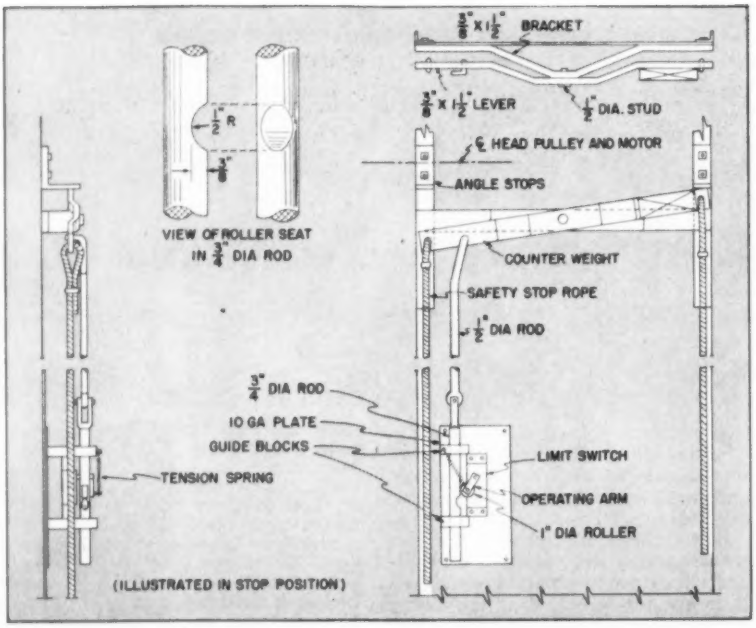


Fig. 3. Detailed drawing showing one arrangement by which the safety rope will cause the manlift to stop in response to a pull in either direction

Lighting should be arranged so that the lift cannot run in the dark. Lighting should be on an independent circuit without a manual switch, and with a relay in the motor control circuit that will stop the manlift, or will prevent its being started, if the lights should go out.

For the protection of mechanics, janitors, and others who have occasion to work around manlift openings, control circuit switches can be located at each landing which can be locked in the "off" position when desired.

Even after all of the best safety refinements have been built into a manlift, it is still a vertical transportation device that will stay really safe only as it is kept so by good routine preventive maintenance and inspection, and by the enforcement of recognized safety rules.

Fig. 4. Screw take-ups have been replaced by a weight box between the inner faces of the belt and above the boot pulley

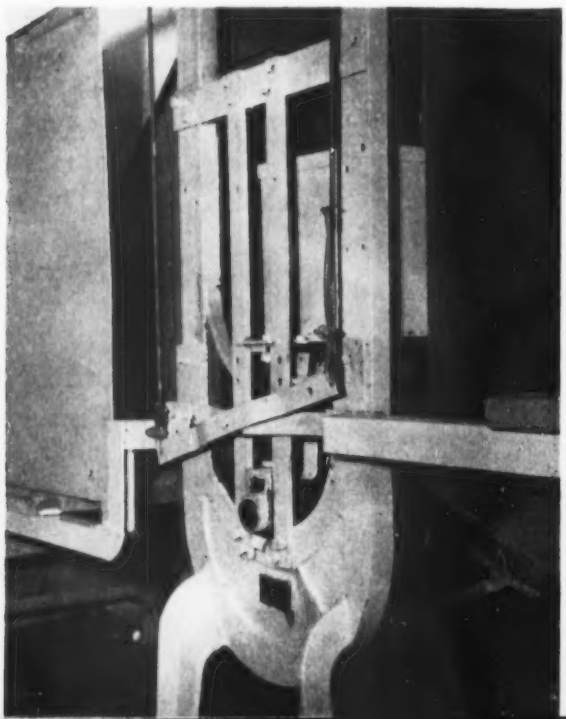


Fig. 5. This free-hinged flap of belting or plywood makes handle under step inaccessible. Is better than cup handle

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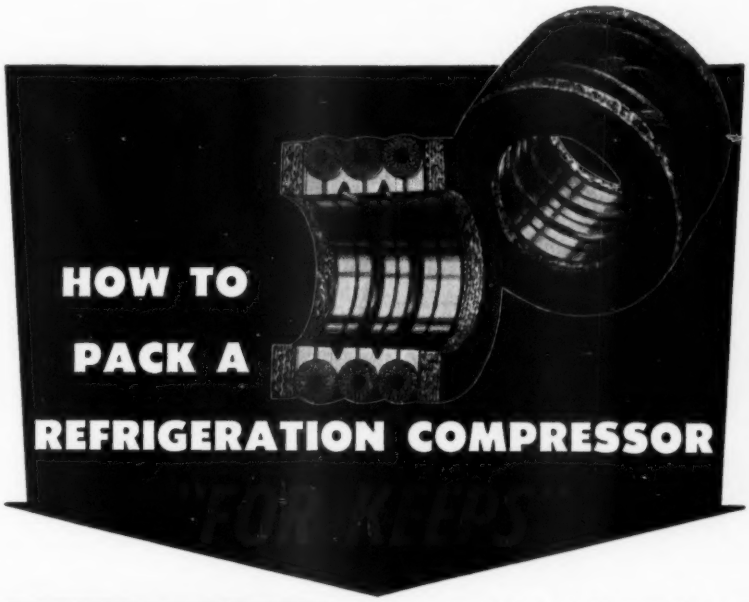

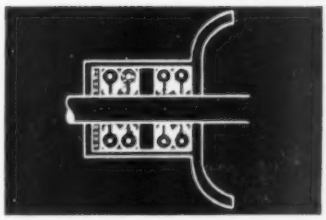

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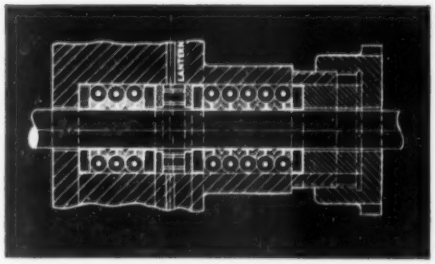

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Copper Casting Method Produces Larger, Easier-Handling Slabs

Production of large copper cakes or slabs in a new copper casting plant will increase materially the output of copper sheet for industry.

Heavy copper cake production has formerly been largely confined to wedge-shaped cakes weighing about 840 lb, which were not only too small for economical operation at the rolling mills, but required excess handling in the mills.

Integrated by two subsidiaries of the Anaconda Copper Mining Co., an increase in production coupled with an increase in cake size will make it possible to roll longer, heavier coils of copper sheet.

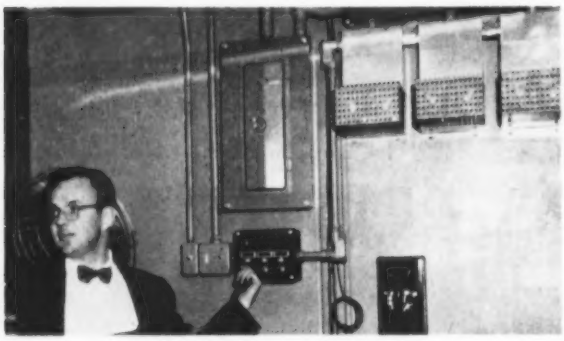
The new plant of the American Smelting and Refining Co., in Perth Amboy, N. J., will produce parallel-sided slabs, weighing from 1800 to 3000 lb each, for delivery to the American Brass Co., for rolling.

Built around two oil-fired furnaces, the plant will produce electrolytic copper cakes of 99.95 plus copper content. The copper slabs will be 65 to 76 in. long, 5 in. thick, and from 15 to 25 in. wide.

Fluorescent Lamp Dimming System Installed Commercially

An executive conference room in the offices of the Ford Division of the Ford Motor Co., Livonia, Michigan, is the scene of the first commercial installation of a newly-developed fluorescent light dimming system.

Manufactured by General Electric's Specialty Transformer and Ballast Dept., the system controls ninety-three 40-watt rapid-start lamps, mounted 34 in. above semi-transparent plastic sheets in luminous-ceiling type lighting. The lamps are divided into three groups which can be controlled individually or collectively by three dimming units.



According to GE engineers, fluorescent lamps on dimming circuits offer several advantages over filament lamps, such as higher efficiency over dimming range, lower operating costs, and better color control. While filament lamps become increasingly red as they are dimmed, fluorescent lamps change very little in color over their entire brightness range.

Components of the GE dimming system, excluding lamps, are a dimming ballast for each operating lamp, a thyratron unit, and an intensity selector. The circuit, designed for 40-watt rapid-start lamps, requires a 240-v supply to the electronic control. Brightness is controlled by a small potentiometer selector, which can be located either at the electronic unit or any convenient place. Special controls might make use of a selsyn-driven potentiometer to provide automatic control in either direction.

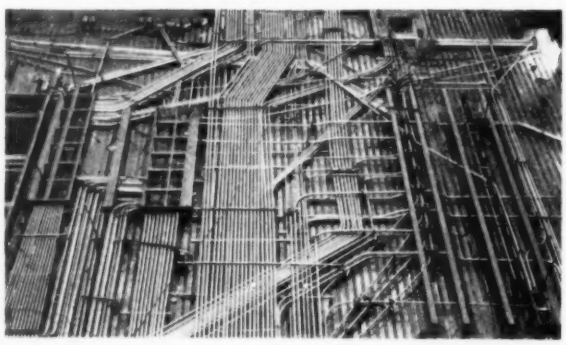
Maze of Conduit Carries Wire Network in Steel Mill Construction

One of the fastest of its type in the world, a new 66-in. semi-continuous hot strip mill has just been put into operation at the Allenport, Pa. works of the Pittsburgh Steel Company.

To achieve its rated top speed of 1770 fpm, the mill uses four finishing stands, and future planned expansion with two additional finishing stands will raise the mill speed to 2230 fpm.

To service the 1800 tons of electric drives and control equipment in the mill, upwards of 35,000 hp total, some 325,000 ft of conduit were installed. Ranging in size from ¾ in. to 5 in., they ultimately held over 1½ million ft of wire.

A great portion of this conduit was laid in the floor slab, and pre-pour views of the installation showed a tremendous maze of conduit. Installed by the Harlan Electrical Construction Co., the conduit installation required some advanced methods, specialized tools, and considerable ingenuity to weave the resulting pattern.



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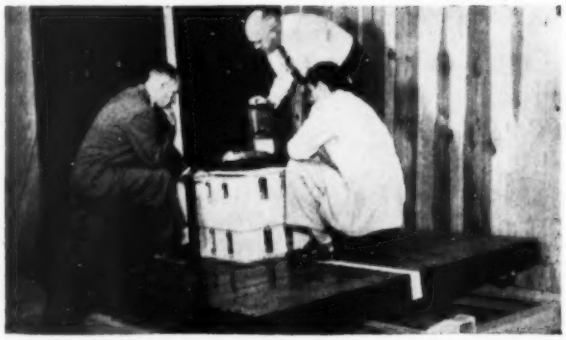
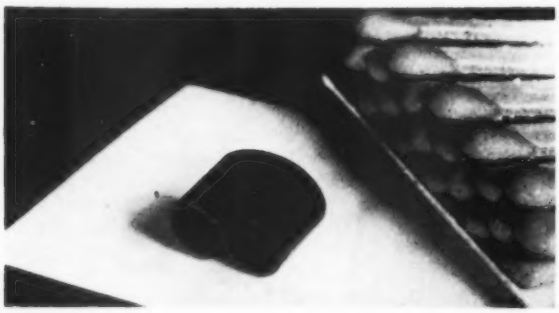
Laboratory Testing Incline Simulates Railroad Car "Humping"



One of the first jobs for a new incline tester, built to specifications of the Association of American Railroads for the lab of the American Box Co., Cleveland, Ohio, was to approve the shock resistance of a wirebound container for shipping cast iron sanitary ware.

The container to be tested was placed on the dolly, pulled up the incline automatically to a predetermined height, then released and allowed to collide against a rigid backboard at the bottom of the incline. This shock simulates the "humping" of a freight car, and is accurately recorded on an Impact-O-Graph impact recorder. Results of this impact test are correlated with other similar tests to determine the quality of the container design, and provide basis for design revision.

Stainless Spring Steel Formed into Smallest Neg'ator



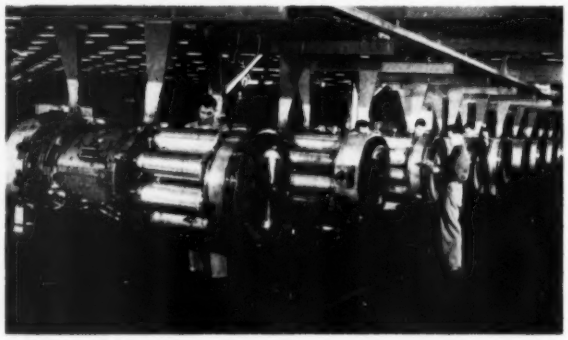
Placed for comparison on a white card, the smallest neg'ator yet made by the Hunter Spring Co., Lansdale, Pa., occupies little more space than a few match heads.

Used in a pressure governor on a commercial aircraft type, the neg'ator has a force output of only 11 ounces, which remains constant through a distance of about one inch. The stainless is 0.0025 in. thick and 0.281 in. wide. Each of the coils is 3/16 in. in dia.

Typical applications of neg'ators include use as extension members of mechanical motors in typewriters, counterbalances, slot closures, timers and camera drives.

At the other extreme, the largest neg'ator ever produced has an energy storage capacity of 30,000 ft-lb.

Overhead Conveyor on Jet Engine Assembly Line Speeds Production

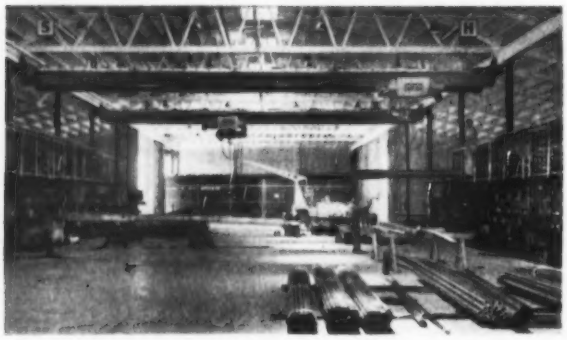


Because the engines in production hang from an overhead conveyor as they move down the line, the new J-47 jet engine production line at the General Electric Co. plant near Cincinnati is called a "grape arbor." The overhead carrier is part of a completely mechanized assembly line recently installed to speed production of the jet engines for the armed forces.

This is probably the first completely mechanized jet engine conveyor system in the country.

Waste motion formerly utilized in moving engines from operation to operation manually has been abolished by the system. The industrial grape arbor innovation permits automatic engine movement from station to station, allowing concentration on the assembly process.

Swivel-Mounted Overhead Crane Hoist Turns with the Load



An overhead crane installation recently made in the new steel warehouse of Perry Kilsby, Inc., Los Angeles, presents an unusual application story.

On two 3-ton capacity cranes, spanning 47 ft, the CraneVeyor Corp. has installed the hoist units on a special swivel base. The resultant swivel action permits the hoists to be turned in any direction on a 280 degree arc. Basically, it permits the load to be pulled with the grooving of the hoist drum, rather than across the grooves, regardless of the position of the load in respect to the crane beam. A locking mechanism can be used to secure the hoist in any desired position.

The unit functions to best advantage in unloading box cars or handling light tubular or bar stock.

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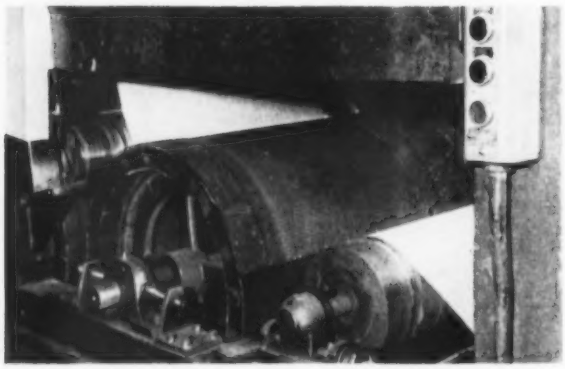
Aluminum Roofing Goes On in a Hurry with Stud Welding Guns

Installing corrugated aluminum roofing and siding in record time is claimed on a recently completed building at the Reynolds Alloys Company's Sheffield, Alabama plant.

Employing the Nelweld method, of the Nelson Stud Welding Division, a seven-man crew installed a total of 164 squares (16,400 sq ft) of 0.032-in. corrugated aluminum on the roof in a single 8-hr day. The crew averaged 104 squares of installed roofing per day throughout the project, on straight runs which required no cutting. On siding, with a 5-man crew, top production reached 54 squares a day, with an average of 45.

Conveyor Belting Adapted for Non-Slip Duty on Carrier Rolls



To assure proper tension on coated abrasive stock during processing, the Behr-Manning Corp. uses rubber conveyor belts in an unorthodox installation.

Company engineers cover carrier rolls with Ruff-Top conveyor belt made by the Thermoid Co., Trenton, N. J. This special belting material, ordinarily used as conveyor belting, has thousands of gripper points of irregular shape in its surface to prevent slippage.

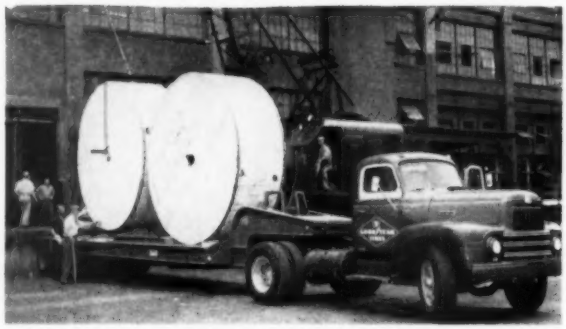
In the manufacture of coated abrasives, proper winding of the stock through rollers is essential as it passes through the processing steps. At one step, after the material is coated with grain and bond, it must be dried in long ovens. The rollers covered with Ruff-Top control the movement of the abrasive stock as it passes continuously from backing to drying, and prevent undesirable slippage between the stock and the rolls.

Big Belts Loaded for Shipment to Texas to Form Long Conveyor

Fourteen 2,000-ft rolls of conveyor belting, weighing 25,000 lb each are being shipped by Goodyear Tire & Rubber Co. to a Texas customer.

The total 28,000 ft of 42-in. wide conveyor belt will be augmented by 7,000 ft of 36-in. wide belt, to carry lignite from a strip mining field to a power plant near Rockdale, Texas.

At the strip mine site, Goodyear crews will splice the sections of belt together as they are unrolled off the spools. The belting is constructed of specially-compounded cold rubber and fabric, will carry a top capacity load of 2,000,000 lb of lignite an hour at a speed of 550 fpm over the conveyor. Operation of the belt system will require 950 hp.



Air Cleaner Water Wash Valve Controlled from Floor Level

Locating their Trion electronic air cleansers 20 ft above the plant floors was a good idea for space economy, at the Mennen Company's new plant near Morristown, N.J., but cleaning also had to be considered.

The cleaning procedure for most Trion units is not too difficult when their floor locations make them readily accessible. But with the units at the 20-ft height, cleaning became a "how-to-get-there" problem.

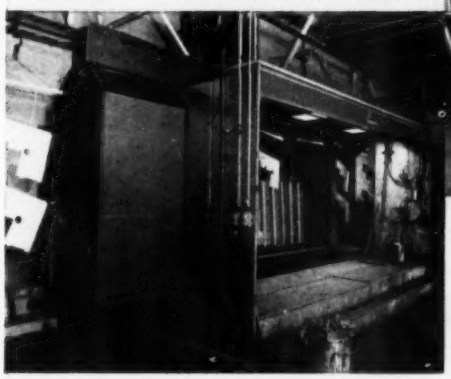
To solve the problem, Mennen installed an electrical switch on a building column near the unit, about 5 ft from the floor. This switch is connected to a pneumatic valve located on the power pack of the air cleanser. By flicking the switch, the aluminum collector plates are spray washed as the valve opens to start the water wash system incorporated in the air cleaner unit.

COMPLETE *Finishing* SYSTEMS

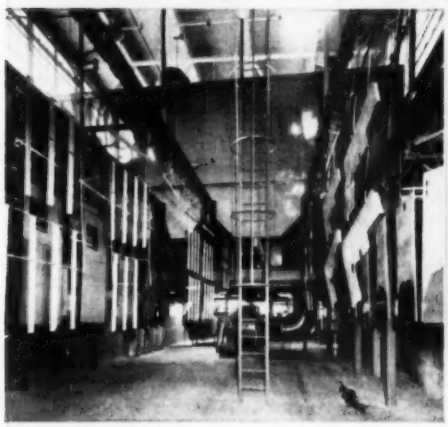
. . . for ENAMELS • LACQUER • PAINT • VARNISH

Exit end of Mahon Two-Conveyor-Line Metal Cleaning and Rust Proofing Machine at American-Standard, Buffalo, N. Y.

Entrance end of Mahon Metal Cleaning and Rust Proofing Machine with two parallel conveyor lines. Note combined Dry-Off and Finish Baking Oven overhead at right.



One of four Mahon Conventional Type Hydro-Filter Spray Booths with 'Hydaire" Flood Sheet—part of the Complete Mahon Finishing System at American-Standard.



Mahon Overhead, Bottom Entrance, Combined Dry-Off and Finish Baking Oven at American-Standard. Dry-Off section is at the right. Temperature Control is Automatic.

American-Standard Products Receive Their Fine Finish in Mahon Equipment!

Illustrated here are major elements of one of two Complete Finishing Systems recently installed by Mahon in the Buffalo Stamping Plant of American-Standard. In this particular system, which is ultramodern in every respect, jackets and other metal parts of residential heating and cooling units are carried through the entire system on two parallel conveyor lines. Metal Cleaning and Rust Proofing is accomplished on the two conveyor lines in a single processing tunnel. The two parallel conveyor lines then carry parts through an overhead bottom entrance, single-pass Dry-Off Oven which is an integral part of the Finish Baking Oven. Parts on each of the conveyor lines then pass through two conventional type Hydro-Filter Spray Booths, staggered right and left hand, where the finish is applied. Finish is baked while the two parallel conveyors make a double pass circuit in the finish baking section of the overhead oven. This is a typical Mahon engineered Finishing System. If you are contemplating new finishing equipment, you too, will find that Mahon engineers are better qualified to do the all-important planning and engineering which is the key to fine finishes at minimum cost . . . and you will also find Mahon equipment more economical to operate over a longer period of time. See Mahon's Insert in Sweet's Plant Engineering File for further information, or write for Catalog A-653.

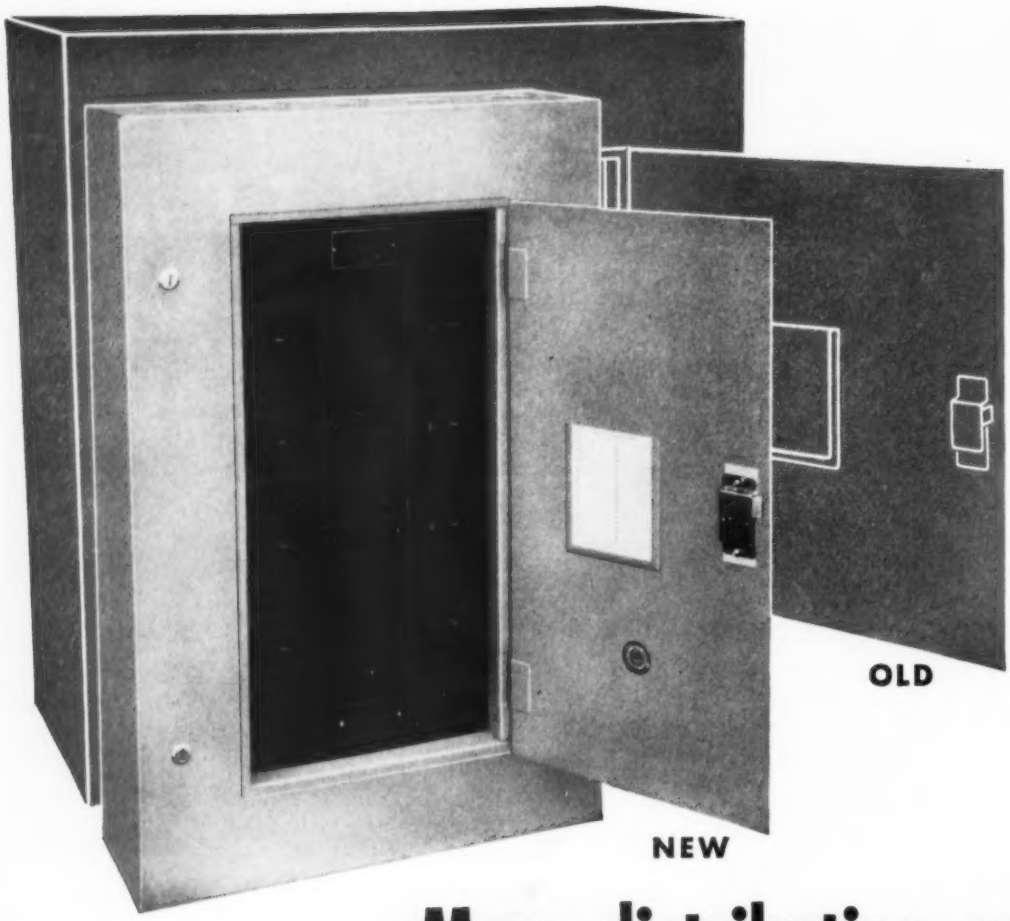
THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other units of Special Production Equipment.

MAHON

For more facts circle 571 on Reply Card



More distribution capacity in less space

Here's a more compact Convertible Distribution Panelboard for 240-volt, a-c* applications, up to 600-amp capacity with main lugs, or 225-amp main breaker with branch circuit breakers up to 100 amperes, 1, 2 or 3 pole.

This new NDP Panel supplements the well-known Westinghouse Type CDP Convertible Distribution Panel. In a cabinet 20″ wide, it is now possible to obtain circuit capacities for single phase as well as 3 phase and 3-phase 4-wire service, which formerly required the use of 30″ wide cabinets.

Certainly this outstanding development points to savings in money, material and space. Take advantage of it now. Simply call your Westinghouse Representative or write for DB-30-930, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-93495

*—*also 125/250 volt, 3-wire d-c systems*

YOU CAN BE SURE...IF IT'S

Westinghouse

For more facts circle 572 on Reply Card

how BARRETT helps you keep maintenance costs down

POWEROX IS A GOOD EXAMPLE OF THE BARRETT MONEY-SAVING LINE.

Rugged stamina—long service life—simple construction, all are POWEROX performance features; your assurance of minimum non-productive down time for repairs. You will find a labor-saving Barrett product designed to solve your handling job . . . economically!

HAND AND POWER LIFT TRUCKS
• HI-LIFTS • TELESCOPIC LIFTS •
AISLE-SAVER • LIFT-A-LOFT •
NIFTY-SYSTEM • SKIDS • DOLLIES

NEW

YOUR PLANT MANAGER WILL WANT THIS INFORMATIVE CATALOG 535 on the complete Barrett line. A request will bring his copy, promptly!

2 Remove hood . . . expose working parts for quick adjustment.

It's that fast—and simple! No wasted time. Barrett design makes it easy for you to "get at" the adjustment job in a hurry.

POWEROX Model POK. Walkie type. 4000 to 6000 lb capacities.

BARRETT-CRAVENS COMPANY
4649 S. Western Blvd., Chicago 9, Illinois
Representatives in All Principal Cities
Canadian Licensee:
S. A. Armstrong, Ltd., Toronto, Canada

Barrett Handling Equipment

BARRETT
ONE MAN DOES MORE THAN 3 OR 4...WITH A BARRETT

For more facts circle 573 on Reply Card

NEXT TIME...ORDER SCOTTISSUE TOWELS!

1. They drink up water like an Airedale in August.
2. They're strong — even when soaking wet.
3. They're so soft that many people use them as face cloths.
4. They're clean and white — of course.
5. They're double-fold to dry double-quick.

EVER PLAY
"GUESS THE WEIGHT"?

ScotTissue Towels have an exceptionally high fibre content. This "bulk," plus generous size and double fold, makes a case of 3,750 ScotTissue Towels weigh 46 lbs.* Some paper towels cost less for 3,750 but are 10 to 20 lbs. lighter* — hence less drying power. Write for more facts. Scott Paper Company, Dept. PE-1 Chester, Pa.

*Shipping weight

SCOTTISSUE **TOWELS**

Symbol of the right kind of washroom

"ScotTissue," Reg. U. S. Pat. Off.

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Reliable Design-

simple solenoid action

guarantees trouble free

starter operation

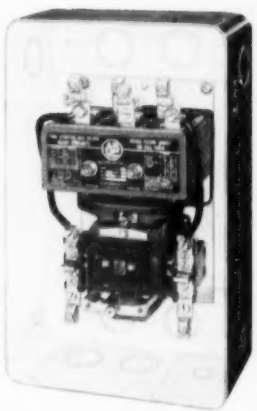
● Allen-Bradley quality motor controls permit you to maintain continuing operation of your equipment . . . keep your plant humming under heavy production schedules. Why?

In all Allen-Bradley controls the simple up-and-down motion of the solenoid plunger is frictionless. There are no troublemaking pivots, pins, bearings, or intricate linkages to corrode and stick. Furthermore, Allen-Bradley double break, silver alloy contacts require no maintenance.

For trouble free motor control, specify Allen-Bradley. They're QUALITY control!

Allen-Bradley Co.
1317 S. First St., Milwaukee 4, Wisconsin

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL



Bulletin 709 Size 3 Solenoid Starter. Maximum Ratings: 30 hp, 220 v; 50 hp, 440-550 v.

For more facts circle 575 on Reply Card

NEW PRODUCTS & PROCESSES

summarized for your convenience

Edited by M. E. Heniken

1—PIPE COVERING wears its own aluminum jacket

Foamglas, all wrapped up in aluminum, makes a new pipe covering that goes on fast, looks neat, is easily kept clean.

The covering is ready to apply right out of the carton. Furnished in sections 18-in. long, it's hinged like a book. You open it out, clamp it around the pipe, and band it in place.

For cold lines (applications of 50 F or below) there's one extra step. Longitudinal and butt joints should be buttered with a sealer.

Besides ease of installation and the sanitary advantage of easy cleaning, this aluminum jacketed insulation offers two more advantages, according to manufacturer. The aluminum covering provides more impact resistance and its reflective value adds to the thermal insulating qualities of the insulation.

The material comes in thicknesses of 1, 1½, 2, 2½, 3 or 4 in., for ¼- to 14-in. pipe. Pittsburgh Corning Corp.

For use on cold lines a mastic is applied to assure moisture-tight joints

Lights on the man's wrist show how directly this covering goes around pipe

2—INDICATING INSTRUMENTS are rugged and readable

Two series of improved portable electric instruments, Types DP-11 and DP-12, are available to indicate volts, watts, amps, and milliamps. The DP-11 is for general testing by electrical maintenance men who need a rugged, easily-read indicating instrument with an accuracy of ½ of one per cent of full scale. The DP-12 is a high-precision instrument for laboratory, plant and production use.

Manufacturer points out that even under rough handling, the spring mounted jewel bearings prevent damage to the indicating mechanisms, and

that the longer scales permit increased readability, and have unbreakable windows. Both units contain a moving coil and a concentric magnetic structure with soft iron core. Two alnico magnets are die-cast inside a soft steel ring. The moving coil and iron core are mounted in a separate die-cast frame between the two alnico magnets. General Electric Co.

3—GEARMOTORS are compact, integral power units

This series of gearmotors features a wide selection of integral power units with single (780 to 280 rpm), double (230 to 45 rpm) or triple (37 to 7.5 rpm) speed reduction. They are available with any of company's motors—a-c, squirrel-cage, wound rotor, d-c or multi-speed; in open-protected splash-proof, totally-enclosed non-ventilated, totally-enclosed fan-cooled and explosion-proof closures. Frame sizes range from 1 to 150 hp. Mountings may be horizontal, ceiling, sidewall or inclined. Also available is a complete integral power unit with disc-brake.

A feature of the new line is a positive oil seal between gears and high-speed bearing which serves to lengthen bearing life by sealing off abrasive matter. Bulletin PB-18000-1 gives design information on these gearmotors. Crocker-Wheeler Div., Elliott Co.

4—METAL TREAD affords safer footing on ladders

A new tread, now optional on this manufacturer's ladders and work platforms is formed from a single piece of heavy gauge steel which is cut, punched and raised. The edge of each half of the raised steel is serrated to furnish non-slip foot grip even when workers' shoes are oil or water-soaked, according to manufacturer. In addition, the tread cleans the soles of workers' shoes, removing metal chips, oil-soaked paper or other objects which might cause workers to slip. The design permits dirt and accumulated material to drop through the holes, making the new tread self-cleaning. Ballymore Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards on pages 39-40 and 191-192.

5—LUBRICATING OILS for general industrial use

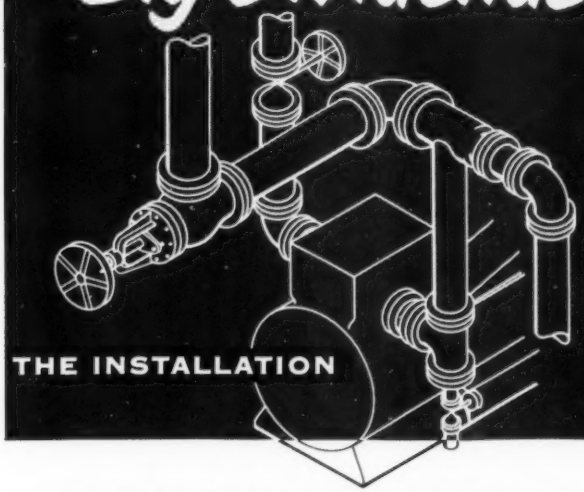
Claimed to give more lubrication per dollar, the new Solnus Oils are offered to meet the demand for better moderately-priced general lubricants. They have wide application and improved time-temperature characteristics, company points out, and are available in a wide variety of viscosity grades, all of which offer excellent oxidation stability and corrosion protection and very low carbon residue.

The oils can be applied by any method, are suggested for lubrication of plain and anti-friction bearings, linkages, slides, cams. They may also be used in gear boxes, hydraulic systems, industrial diesels, compressors. Properties and advantages of these new lubricants are discussed in detail in Technical Bulletin 17. Sun Oil Co.

6—ATOMIZING SYSTEM for plant-wide pest control

With this automatic permanent atomizing system one man can spread an insect-killing fog throughout all plant areas simultaneously to provide instant control of lying and crawling insects. Here's how it works: Compact atomizer units are attached by pipeline to an insecticide reservoir on the

Thrifty Valve Buying in 1918 Still Paying Big Dividends



THE INSTALLATION

At the American Crystal Sugar Company's Rocky Ford, Colorado, mill where Crane 12-inch iron body angle valves control carbon dioxide to pumps supplying the gas for carbonation process.

VALVE SERVICE-RATINGS

SUITABILITY:	Never failed in 35 years
FEATURES:	Simplified design—easy to service
MAINTENANCE COST:	None—Routine care only
SERVICE LIFE:	Installed 1918—still O.K.
OPERATING RESULTS:	Dependable CO_2 control
AVAILABILITY:	Crane catalog item—No. 353

THE CASE HISTORY

This CO_2 service requires valves of utmost dependability to protect process and equipment from damage. In the event of malfunction or failure of pumps, the valves must assure positive closure every time.

That's precisely the quality of performance Crane No. 353 valves have given in this service for more than 35 years. The mill's long inactivity between 75-day production campaigns hasn't made the job easier. Yet, these valves have never been out of the lines for repairs; they've remained on the job since 1918 with only routine maintenance.

Valves that set performance records like this aren't bought on price alone—it's quality that counts most. That's thrifty buying—still the only way of getting the best value.

THE VALVE

You can see the ruggedness and serviceability of No. 353 angle valves, but it's what's inside that counts most in their better performance. Choose these valves from the complete family of Crane 125-pound iron body globes and angles. It gives you the widest selection of patterns and types for steam, water, oil, and gas. See your Crane Catalog or your Crane Representative.

THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES · FITTINGS · PIPE · PLUMBING · HEATING

For more facts circle 576 on Reply Card

NEW PRODUCTS

(Begins on page 134)

roof and to the plant's compressed air or steam system. Utilizing the compressed air or steam as propellant, the atomizer units serve to break liquid insecticide into small droplets, spraying them out as a fine mist that remains suspended in the air and penetrates into openings and crevices.

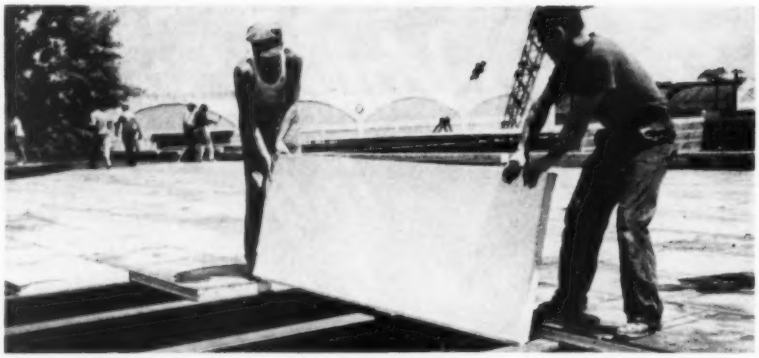
While control of the equipment can be centralized, the system can also be so tailored that cut-off valves are installed for areas requiring less treatment. Company says one atomizer can fog 100,000 cu ft of space in 10 min and recommends its own insecticide, Vaposector, for the system. Vaposector, when used as directed, is claimed to be non-injurious to persons and other warm blooded animals and to leave no after-taste or odor. Company says it can be used safely in almost any industry, including food processing, brewing, milling and textile fields. West Disinfecting Co.

7—GRIPPER ARMS for fork lift handling of drums

The lift truck operator pictured is arranging four oil drums in order to pick them up neatly with a new gripper arm attachment for fork lifts. Several major advantages are announced for this attachment: It makes use of friction distributed over a relatively large area, rather than localized pressure alone, for lifting and holding the drums to permit the handling of larger loads without crushing. The arms are flexible and shaped to provide a firm grip

to hold safely despite quick stops. Their thinness permits close stacking of loads for efficient use of warehouse space. The attachment operates without any type of bottom support for the drums. It holds either drums or packages—the largest model being designed to handle up to nearly 4000 lb, or four 55-gal drums, or the equal in cases, quarter drums, kegs and pails.

Developed as a project of Shell Oil Co.'s marketing operations, with a view toward cutting handling costs in that company's own plants and warehouses, the device was constructed by The Elwell-Parker Electric Co. under Shell guidance. It is to be produced by manufacturers licensed by Shell, and is expected to be marketed for general industrial use within the next few months. Shell Oil Co.



8—ROOFING DECK has insulating and acoustical features

Tectum is announced as combining the essential properties of light weight, incombustibility, insulation, and acoustics. This new roofing material is made from a wood fiber base bonded together with an inorganic cement under heat and pressure—the binding serving the additional purpose of fireproofing the fibers. According to manufacturer, Tectum doesn't burn, rot, weaken with age, or appeal to termites. It can be sawed, chopped, nailed, or drilled.

In the manufacture of Tectum no chemical change is made in the wood fiber; advantage is taken of the natural strength of the wood. Company says it is stronger in many ways than plain concrete, and that its structural properties permit a uniform loading of about 300 lb per sq ft for spans recommended for the various thicknesses.

Because of its high insulating value, Tectum can effect fuel savings through reduced heat losses through the deck, it is pointed out. And because of its acoustical properties and pleasing appearance it may be left exposed and thus serve the purpose of a ceiling.

Reported competitive in price with many other deck structures; Tectum is manufactured to desired sizes and thicknesses. When shipped from the factory the roof plank is tongued and grooved on two sides, in order that roof loads are distributed laterally from one plank to another. It has a factory-applied roofers felt on the top surface to protect the plank against the elements and provide a smooth surface for built-up roofing. Full details on this new deck are available from the manufacturer. Tectum Corp.

9—UNIT HEATERS come in seven sizes, are gas fired

These new gas-fired unit heaters are announced as suitable for use on all types of natural, manufactured and liquefied petroleum gases. Heat output ranges from 20,000 to 160,000 Btu per hour, with fan diameters from 12 to 20 in. Finished in grey-green baked enamel, these modern units are suggested for use wherever appearance is a factor and where a central heating system is not available. They are fully described in Bulletin 715. American Air Filter Co., Inc.

10—SLUDGE CONTROLLER for the heavily laden liquids

Essentially, this 8-in. dia squeeze controller is designed to control the flow of sludge or heavily laden liquids. Of the electrical transmission mechanical type, the controller is said to overcome most of the difficulties of regulating heavy viscous flows, even if corrosive, without affecting the moving parts of the controlling mechanism.

Its flexible rubber section has no pockets or restrictions which could trap putrescent material since the unit is self-scouring, company points out; and it can produce a condition of complete cut-off, if necessary or of complete wide-open maximum flow.

The core of the device is a venturi tube with a throat section of flexible rubber. Differential pressure in the venturi is transmitted to a rate setter which measures and maintains the desired flow. If the flow tends to change, this meter actuates a motor-driven clamping device in the controller to adjust the flexible throat area. Simplex Valve & Meter Co.

11—WIRING TROUGH cuts wireway installation time

Lay-In Duct is said to reduce installation time by as much as 20 per cent. All lengths and connectors are hinged to provide an unobstructed wireway to "lay-in" conductors. Knockouts match the manufacturer's other switches, breakers, service equipment, contactors and starters for faster installation without conduit bending. Two screws join the two duct lengths.

Lay-In Duct comes in standardized sections, in 2-½ by 2-½ in.; 4 by 4

1878 75 1953
YEARS OF ELECTRICAL PROGRESS

1. STORAGE AREA at right, used for storage of rough castings, became as accessible at night as during the day with G-E outdoor industrial lighting. Lighting assured quick, safe location of parts for night shift workers; more efficient and profitable plant operation.

2. PARKING LOT offers fast, easy parking, with little chance of accidents. An industrial parking lot installation also protects cars and contents against pilfering.

3. BOUNDARY FENCE illumination cuts down pilfering and sabotage, provides high visibility along boundary fence for 24-hour protection at surprisingly little cost.

USE EXISTING SPACE FULLY GAIN EFFICIENCY, SAFETY WITH G-E OUTDOOR LIGHTING

At little cost, you can actually double the usefulness of many of your plant facilities by doubling the hours in which they can be used—with G-E Outdoor Industrial Lighting. Outdoor storage areas, formerly inaccessible and dangerous after dark, are opened for profitable, 'round-the-clock operation with G-E outdoor industrial lighting.

You gain speed and efficiency, safety and security, when you illuminate loading platforms, entrance gates, parking lots, and plant entrances. And you'll find that an investment in adequate G-E outdoor lighting will pay for itself over and over again.

With G-E outdoor industrial lighting, your plant is safer in two vital ways—it's protected against outside intrusion, pilfering, and sabotage, and against costly employee accidents.

Whatever your outdoor lighting needs, G.E. has a complete range of industrial lighting equipment to exactly suit your requirements. Call your local G.E. Sales Office or authorized distributor for advice on good lighting at your plant. Or write for "Outdoor Lighting for Industrial Plants." Just ask for GEA-3640. Address Section 451-184, General Electric Company, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

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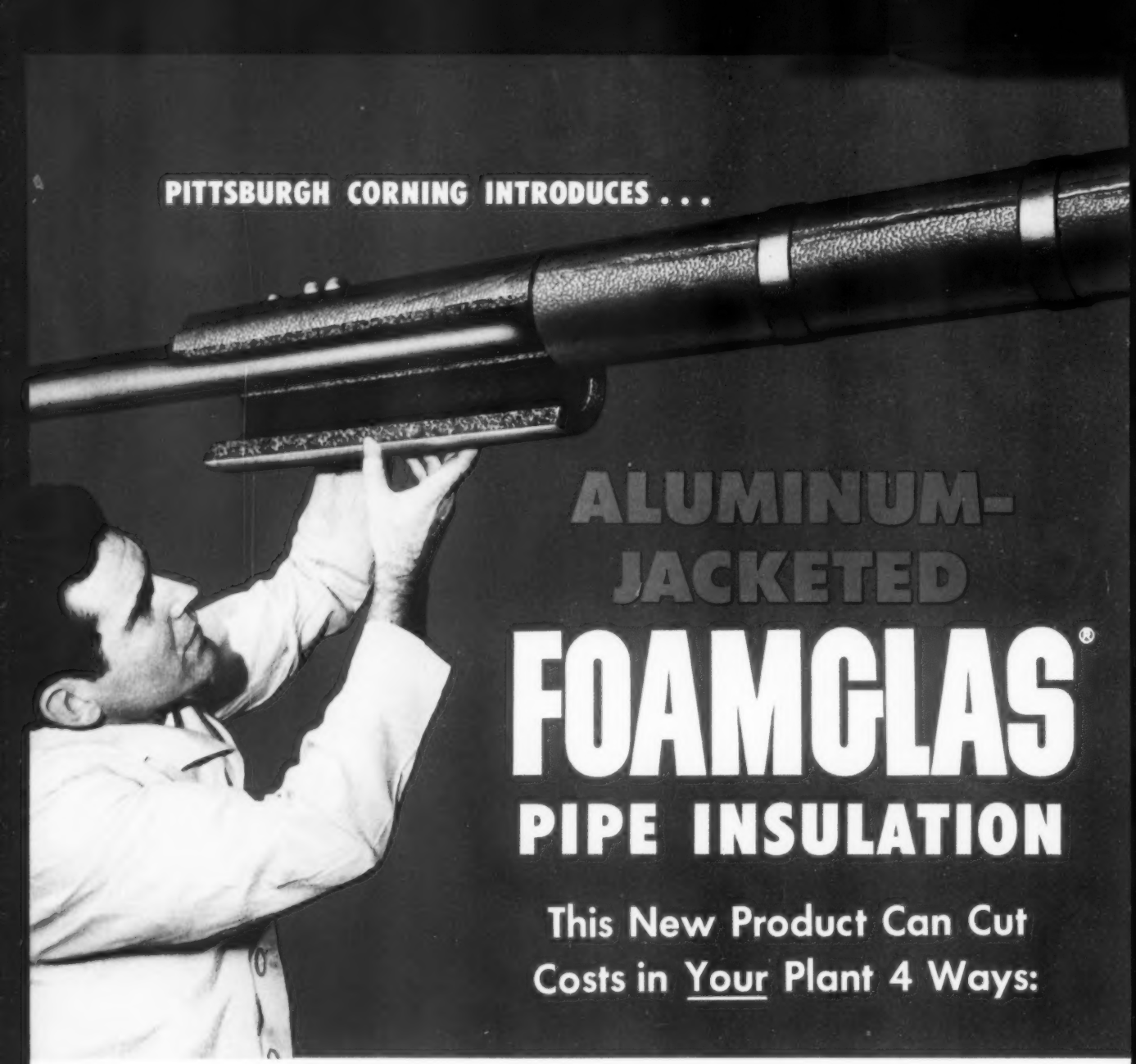
(For more facts circle 578 on Reply Card →



Eliminates Costly Steps in Application:

Already jacketed with aluminum at the factory, this new FOAMGLAS pipe covering gives you moisture-proof insulation, weather-proof jacket and attractive finish all-in-one.

Provides a Beautiful Finish at Minimum Cost:

Just slip Aluminum-jacketed FOAMGLAS on the pipe, fasten with bands and you have a most eye-appealing installation without the customary high costs required to give an attractive finish to ordinary insulations and field-applied jackets.

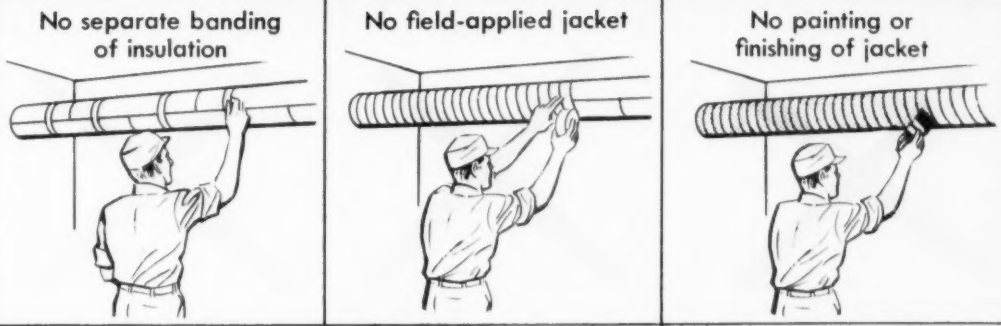
Avoids Maintenance Expense:

Now you have the rot-proof, fire-proof, acid-proof qualities of FOAMGLAS in the finish. It takes abuse and is weather-resistant even in industrial atmospheres. The smooth, wrinkle-free surface of .004" thick, stippled aluminum is sanitary, easy to clean, saves the expense of re-painting year-after-year.

Increases Insulation Efficiency:

The heat reflecting asset of the aluminum jacket supplements the unequalled insulating properties of FOAMGLAS . . . the rigid, cellular glass insulation that *stays dry* inherently, retaining its original insulating efficiency.

ALUMINUM-JACKETED FOAMGLAS eliminates these steps



Installation is as easy as this

The simplicity of these specifications confirms how much you will save in labor and materials costs by standardizing on Aluminum-jacketed FOAMGLAS:

For cold and hot water and process lines (56° to 212° F)

1. Slip on Aluminum-jacketed FOAMGLAS.
2. Band* at butt joints and at center of each segment.

For refrigerated lines (below 56° F)

1. Apply thin coat of sealer** to all joints.
2. Slip on Aluminum-jacketed FOAMGLAS.
3. Band* at butt joints and at center of each segment.

For steam lines (212° F to 800° F)

1. Slip on Aluminum-jacketed FOAMGLAS.
2. Band* at butt joints and at center of each segment.

*Bands shall be aluminum ¾" wide by 0.015" thick . . . similar to those manufactured by A. J. Gerrard Co., Melrose Park, Ill.

**Sealer should be a product similar to "Foamseal" which is aluminum in color (Made by Benjamin Foster Co., Philadelphia, Pa.)

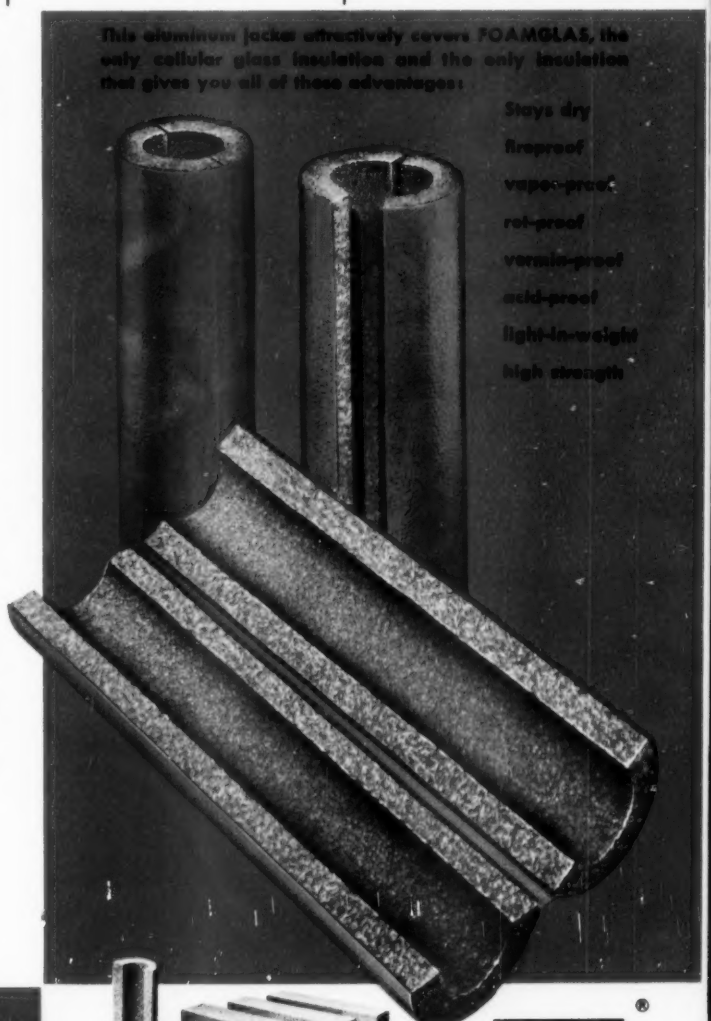
Sizes Available

Aluminum-jacketed FOAMGLAS is available in six thicknesses (for minus 50° to 800° F) for pipe sizes up to 14".

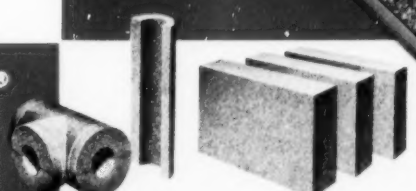
FOAMGLAS pipe insulation is available without jacket or factory-jacketed with either glass fabric or aluminum. FOAMGLAS distributors are located in most principal cities. Write us for name and address of the one nearest you. For complete information about all forms of FOAMGLAS insulation, write us for booklets on uses on piping, equipment, refrigerated structures or normal temperature buildings, indicating your chief interest. Address Dept. FAJ:

PITTSBURGH CORNING CORPORATION

One Gateway Center, Pittsburgh 22, Pa.



FOAMGLAS®



the cellular glass insulation

PITTSBURGH PC CORNING®

● Here's how a prominent steel company recently eliminated a real "time-waster" in its operations. Finished flat stock was not lifted out of the way fast enough . . . resulting in excessive downtime on a large milling machine.

A READING engineer was called in to analyze the situation. Following his recommendation, a CUSTOM BUILT hoist and crane, with an extra-long lift and *push button control of all motions,* was engineered and installed by READING. Now, finished stock is handled faster . . . production is smoother . . . and *only one man* is required to do the job. Maintenance time and dollars are cut because any unit can be removed for overhaul or repair without dismantling other units.

The engineering of special handling systems to fit *any* job is standard practice with READING. For full details on how you can save money with a "tailor made" READING CRANE, just drop us a line today.

Reading Crane & Hoist Corporation, 2103 Adams Street, Reading, Pa.

READING CRANES

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

For more facts circle 579 on Reply Card

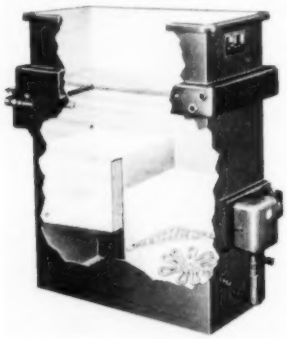
NEW PRODUCTS

(Begins on page 134)

in., and 6 by 6 in. sizes. Fittings with removable covers are available with the same "lay-in" feature, permitting a complete, unbroken wireway system. Screws are captive and self-aligning, and adapter fittings are used to join the unit with other forms of duct, panelboard, switchboard or electrical devices. A universal two-piece hanger is available. Square D Co.

12—VAPOR DEGREASER can handle 200 lb per hour

The No. 100 CS is a combination vapor degreasing unit claimed capable of performing 200 lb of work per hour, either in baskets or in individual pieces. The new unit incorporates cool rinse, hot rinse and vapor degreasing because it has both a rinse and boiling sump along with a water jacketed vapor area. Distilled solvent is collected by means of a condensate return trough, passed through a water separator and returned



to the rinse sump. The boiling sump is fed by overflow from the rinse sump.

Heating is electrical and the unit is available for five current characteristics ranging from 110 v, 60 cycle, single phase, to 550 v, 60 cycle, three phase. Built of 14-gage steel, the compact unit is 42 in. high, 38 in. long and 18 in. wide. A 3000-w cloverleaf type calrod unit in the floor of the sump provides the heating. As a solvent recovery still, the 100 CS has a distillation rate of 7 gph based on a 30 per cent contamination. Phillips Mfg. Co.

13—FORK LIFT TRUCKS have torque converter drive

The Hydratork — a new transmission said to make driving a fork-lift truck as easy as driving a car — is being manufactured for this company's Utilitruc line of trucks in the 6000-7000-lb capacity range. It utilizes the same three simple controls used to operate an automobile: accelerator, brake pedal and forward-reverse selector lever on the steering column. Its design eliminates the need for a gear shift for high and low gears and a clutch and clutch pedal.

A major advantage attributed to the Hydratork is the reduced mainte-

Now Available

NEW Westinghouse GAS-FIRED SPEEDHEATER®

For store, office, factory or warehouse, check these 8 Westinghouse features:

1. Instant on-the-spot HEAT
2. Automatic controls—no attendant needed
3. Ceiling suspension—uses no working space
4. No heat loss as in central plant piping
5. Swift, easy, economical installation; simple upkeep
6. Fully approved safety controls
7. Handsome, functional styling—no finishing cost
8. 7 sizes—25,000 to 200,000 BTU

Heat starts right away—no long warm-up period. Self-contained, ceiling-mounted, the Westinghouse Gas-Fired Speedheater takes no valuable working space, needs no supervision, runs for low cost on natural, manufactured or LP gas. Adjustable louvres control distribution; fan will run separately for air circulation in summer. Get sure heat, save money on installation, avoid work, cut fuel bills—specify the new Westinghouse Gas-Fired Speedheater.

For full details on the Speedheater model best suited for you, call your nearest Westinghouse office for Catalogs 1521 and 1525, or write: Westinghouse Electric Corporation, Air Conditioning Division, Boston 36, Mass.

THE COMPLETE WESTINGHOUSE LINE

Meets Every Unit Heater Need

DOWNBLAST SPEEDHEATER

HORIZONTAL SPEEDHEATER

Get 7 times more output than conventional radiators; save money and space. In addition to the new Gas-Fired units, Westinghouse Speedheaters are available in 82 standard sizes in steam and hot water units. Capacities range from 25,000 to 400,000 BTU in horizontal and vertical models to meet every application.

WESTINGHOUSE AIR CONDITIONING

YOU CAN BE SURE...IF IT'S Westinghouse

J-80335

For more facts circle 580 on Reply Card

ELECTRO DYNAMIC
xtra *ependable*

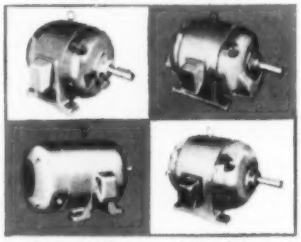
OFFICIAL U. S. NAVY PHOTO TAKEN OFF OAHU, HAWAII

UP FROM THE SEA comes fabulous Motor Stamina for Industry!

Over half a century of service aboard U.S. Navy submarines — *where dependability means life itself* — has bred tremendous stamina into ELECTRO DYNAMIC industrial motors. This inheritance of *extra dependability*, proved during years of gruelling duty under the sea, explains the amazing performance records being established by E.D. motors in industry today.

From 1 to 250 h.p.
(N. E. M. A. STANDARDS)

WRITE TODAY FOR CATALOGUE NO. 970


One-piece cast iron frames.
Extra large "free-flo" air channels.
Permanently aligned cast iron brackets.
Liberal size grease lubricated bearings.

Also a complete line of Direct Current motors and generators

ELECTRO DYNAMIC
DIVISION OF GENERAL DYNAMICS CORPORATION
BAYONNE, NEW JERSEY

For more facts circle 581 on Reply Card

NEW PRODUCTS

(Begins on page 134)

nance resulting from the elimination of gear clashing during gear engagement. Other advantages announced are smoother acceleration, better driver control, easy changeover from forward to reverse motion, and controlled inching. The unit costs $370; must be factory installed. Clark Equipment Co.

14—GERMICIDE for coolant and cutting oil emulsions

Rance-Rid is an industrial germicide and emulsion deodorant declared unusually effective in the treatment of rancid and odorous coolant and cutting oil emulsions. It restores deteriorated emulsion to original condition, company says: and, if added while emulsion is fresh, it prevents rancidity.

According to company, Rance-Rid doesn't mask odors — it functions by reversing the rancidity. And besides restoring sour and rancid emulsions it offers a solution to the costly problem of rendering used emulsions fit for disposal in accordance with stream pollution laws. Rance-Rid comes in 1-, 5- and 25-lb cartons; an ounce treats up to 20 gal of rancid emulsion. Further information and a free test sample is available to qualified plant engineers. Hersen Chemical Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

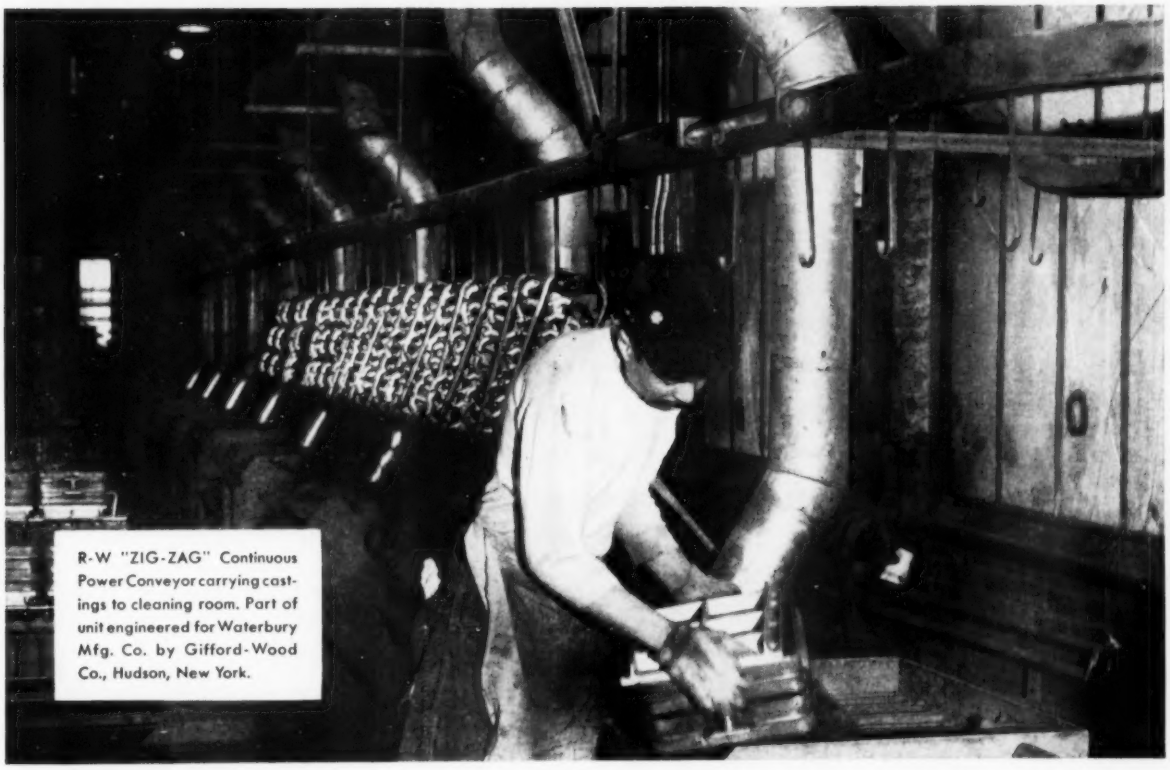
15—TEST PLUG shuts off tube ends for testing

For testing installations before they are put into service or when trouble shooting for leaks, this test plug is inserted in end of tube and the wing nut is tightened, expending the rubber portion of the plug and sealing the tube. The plug will hold pressures up to 100 lb, according to manufacturer, and can be used on liquid or gas tubing lines; for refrigeration, LP gas, and similar applications. Plugs are available in five sizes, $\frac{1}{4}$-, $\frac{3}{8}$-, $\frac{1}{2}$-, $\frac{5}{8}$-, and $\frac{3}{4}$-in. OD. Bulletin 111-REF gives further information. Imperial Brass Mfg. Co.

16—WATER-OIL SEPARATOR for vacuum pump oils

A new, redesigned Houdaille Dri-Pure Water-Oil Separator is reported especially effective in the removal of moisture from vacuum pump oils. It features two filtering compartments using celulose fibre and fullers earth filtering media, plus a thermostatically controlled heating and settling tank. Passage of oil through these sections effects the oil filtration and water sep-

Modern industry chooses
Richards-Wilcox Conveyor Equipment



R-W "ZIG-ZAG" Continuous Power Conveyor carrying castings to cleaning room. Part of unit engineered for Waterbury Mfg. Co. by Gifford-Wood Co., Hudson, New York.

The key to materials handling efficiency is *flexibility* . . . the kind of flexibility you find in a R-W "ZIG-ZAG" Continuous Power Conveyor. It travels up, down, in, out and around . . . like water through a pipe . . . in most cases utilizing space that would otherwise be wasted. ZIG-ZAG moves steadily on the job, requiring a minimum of personnel and reducing bottlenecks and handling mishaps.

Because of these savings . . . in space, personnel, time and safety . . . the Gifford-Wood Company of Hudson, New York, designed and installed a complete Richards-Wilcox ZIG-ZAG Conveyor System for the Waterbury Manufacturing Company, Division of Chase Brass & Copper Co. This unit, designed to handle castings after shakeout, effected remarkable savings in production space, overall production time and maintenance costs.

• • •

Find out how you can raise efficiency, lower costs. Write today for consultation. There's no obligation on your part.

Enclosed Chain

Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

1880 RICHARDS WILCOX RW AURORA 1953

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SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS • ELEVATOR DOOR OPERATING EQUIPMENT

Richards-Wilcox Mfg. Co.

MATERIALS HANDLING DIVISION

460 THIRD STREET, AURORA, ILLINOIS

For more facts circle 582 on Reply Card

STOP VIBRATION

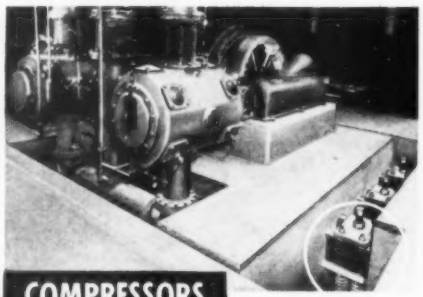
WITH KORFUND VIBRATION CONTROL AND

- Install Equipment Anywhere (for better plant layout)
- Reduce Equipment Installation Cost
- Increase Production
- Reduce Maintenance
- Improve Employee Efficiency

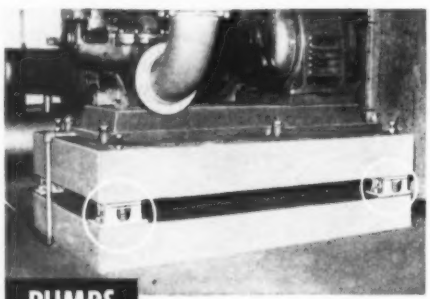
Whether your problem is simple or complex, Korfund engineers will gladly recommend the easiest, most economical, *effective* solution. A half-century of experience is at your disposal. There are standard stock Korfund isolators for the majority of installations — special designs when necessary.

A selector chart is available, giving recommendations for both normal and critical conditions, for pumps, compressors, centrifuges, machine tools, presses, hammers and most other processing and mechanical equipment. Write us for your copy of Bulletin No. 12, or see our catalog in Sweet's Files.

SHAKER SCREENS Korfund Vibro-Isolators installed under these shaker screens, located on a barge, stop vibration transmission into the deck without reducing the efficiency of the shaking action which removes shale cuttings from off-shore oil drilling mud. Another application—low cost upper floor screen installation without reinforcing.



COMPRESSORS Korfund Isolation permitted installation of five 250 H. P. duplex compressors in limited basement space actually overlapping building column footings—yet completely kept vibration from delicate bacteria cultures on upper floors of this pharmaceutical plant.



PUMPS Korfund Vibro-Isolators installed under this large pump and its driving motor completely stop transmission of vibration and objectionable noise to floors below.

For specific recommendations without obligation, contact us or the Korfund representative you'll find in most principal cities.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-35R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

For more facts circle 583 on Reply Card

NEW PRODUCTS

(Begins on page 134)

aration. Quick-opening lids over both filtering compartments offer access to the filter cartridges, replaceable at intervals depending on the degree of oil contamination. The heater unit may be connected to any electrical outlet.

This separator eliminates changing or discarding of oil, it is explained; it enables the pump to pull a high vacuum without oil change or drying out maintenance. The unit can be hooked up to service one or more vacuum pumps. It is also available for turbines, hydraulic systems and similar operations where water creates an oil contamination problem. An equipment bulletin giving details on the Dri-Pure is available. Honan-Crane Corp.

17—SANDER gives fast finish to wood and metal

The Orbit Sander has a rapid oscillating movement which results in a smooth finish ready for any paint, lacquer or varnish, manufacturer states; and it works equally well on flat, curved, horizontal or vertical surfaces. Of aluminum alloy construction, this sander cuts its weight to 5 lb. A full-grip trigger switch handle and front

knob contribute to maneuverability. The sander has ¼ in. orbital motion operating at 4500 cycles per minute, and runs on standard 115-v, a-c, d-c. Mall Tool Co.

18—CORONA TEST SETS for non-destructive testing

According to manufacturer, these corona test sets are safe enough, simple enough and reliable enough for use by non-engineering personnel. The sets consist of a control unit, a detector unit, and a high voltage corona-free testing transformer which incorporates means for picking up corona signals from the equipment under test. In operation, equipment to be tested is connected to the high voltage terminal of the testing transformer and 60 cycle test voltage is increased until corona indication appears on the cathode ray tube in the detector unit. The rms equivalent of peak voltage is then read from the adjacent peak voltmeter.

Two models are offered. Model 1 is rated 0.75 kva 20 kv continuously or 1.5 kva intermittent duty; it is also

◆ Now you can get quick "over-the-counter" Roller Chain Drives in all standard speed ratios and popular horsepower capacities.

The new Diamond Chain "balanced" combination stock inventory includes packaged standard Roller Chains in a range of pitch sizes—Taper Lock Sprockets with replaceable bushings, and finished Fixed Bore Sprockets in the smaller sizes (that requires no re-working) complete with keyways and setscrews.

See the yellow pages of your classified telephone directory for the address of the Diamond Chain distributor.

DIAMOND CHAIN COMPANY, Inc.
Where High Quality is Traditional
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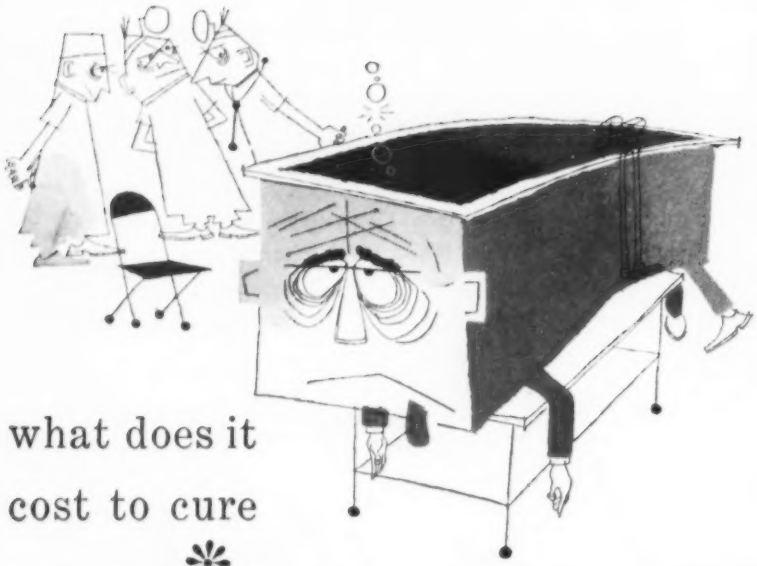
DIAMOND

ROLLER CHAINS AND SPROCKETS *from stock*

DIAMOND ROLLER CHAINS

For more facts circle 584 on Reply Card



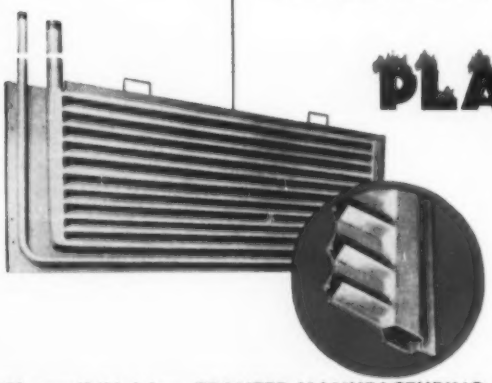
what does it
cost to cure
coil-itis* in your processing tank?

The constant care it takes to keep tanks operating when they're plagued with coil-itis is extremely costly. Downtime, and all the other maintenance time, slow heating and cooling ills of using old-fashioned pipe coils can be cured with Platecoils. As revolutionary as the new wonder drugs, Platecoils save as much as 50% in initial cost. They take 50% less space in the tank. They simplify maintenance and save hours of downtime. Compared to the hours it takes to clean and replace pipe coils, Platecoils can be cleaned and replaced in no time at all . . . without dumping the solution. It costs less to cure coil-itis with Platecoils than to suffer its evils. **Write for bulletin P80 today!**

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS COST LESS TO BUY, INSTALL, MAINTAIN

The Newcomb-Detroit Co., Grand Rapids Division, has found it is less costly to buy, install and maintain Platecoils than to fabricate pipe coils in their own plant. Ask about other case histories.



PLATECOIL
REPLACES PIPE COILS

*Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

Platecoil Division, TRANTER MANUFACTURING, inc., Lansing 4, Michigan

For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 134)

available with a larger control unit with a rating of 2 kva continuous and 5 kva intermittent duty. Model 2 is rated up to 10 kva, 35 kv continuously or 20 kv intermittent duty. Bulletin 66 gives information and prices on these sets. James G. Biddle Co.

19—PROPORTIONING PUMPS for high pressure uses

A new line of low cost proportioning pumps for use in the chemical, textile, petroleum and paper industries and in water treatment in boiler plants, water works, sewage plants, and public utilities has recently been developed. The standard models meter precise quantities of viscous materials, slurries, suspended solids and corrosive liquids in a range of from 0 to 100 gph at pressures to 1200 psi. Special units can be obtained with capacities to 300 gph at pressures to 20,000 psi.

Automatic controlling devices are available that adjust capacity while the pump is operating and all models can be made with special metals, oversized valves, water seals and motors to meet particular operating conditions.

Dual suction and discharge spring loaded valves with valve check balls that seat positively assure the greatest degree of accuracy. In addition, the pumps are designed so that packing can be changed without breaking pipe connections. When required, timers, agitators and liquid level controls can be obtained. Walter H. Eagan Co., Inc.

Use the Reader Service Cards on pages 39-40 and 191-192 to ask for more information on these products. Circle item numbers of products in which you are interested.

20—CARBIDE-TIPPED BLADES for use on radial saws

Designed especially for radial saws, this new line of carbide-tipped blades will cut machine downtime and eliminate some common blade problems, according to manufacturer. They are declared particularly suited for use in crating and similar shipping room operations, and for use on cut-off saws. Manufacturer attributes two major advantages to the new blades: they last from 25 to 100 times longer than many blades, and they cut easily through hard or abrasive materials.

The carbide tips are brazed to blades of high quality tool steel, then diamond-wheel ground to close tolerances. Clearances are ground on the sides of the teeth with diamond wheels to eliminate setting or swaging of the teeth. And because of this built-in swage design, only the carbide cut-

EASY-TO-INSTALL front-connected units and a large, accessible 13-inch conduit space make wiring fast. Lightweight, compact, strong units with stab-on connectors make handling easy.

A G-E PACKAGED JOB and proven dependability of G-E motor control centers sold the planning team of George Sall Metals Company and Kuljian Corporation engineers on specifying G.E.

STEEL BARRIERS isolate live busses from personnel for maximum safety during inspection and maintenance. Disconnect position allows safer maintenance without shutting down the center.

G-E Motor Control Centers Specified For New "Automatic" Processing Plant

The Kuljian Corporation, Philadelphia, engineers and constructors, specified G-E motor control centers to help in the "automatic" processing of scrap metal at the non-ferrous smelting plant of The George Sall Metals Company in Philadelphia. Like other industries—chemical, paper, automotive—where automatic control is important, George Sall Metals wanted the most modern up-to-date equipment available. They had the plant planned for the ultimate in economical and automatic processing.

Whether you are building a new plant or modernizing existing facilities, specify G-E motor control centers for centralized control of a-c motors up to 200 horsepower.

FOR MORE INFORMATION, contact your nearby General Electric Apparatus Sales Office or authorized distributor, or write Section 781-5 for Bulletin GEA-4979A today. General Electric Company, Schenectady 5, New York.

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

You can put your confidence in—

GENERAL ELECTRIC

For more facts circle 586 on Reply Card

BENCH WORK

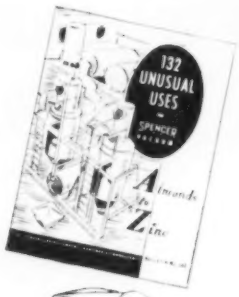
with SPENCER HARTFORD VACUUM

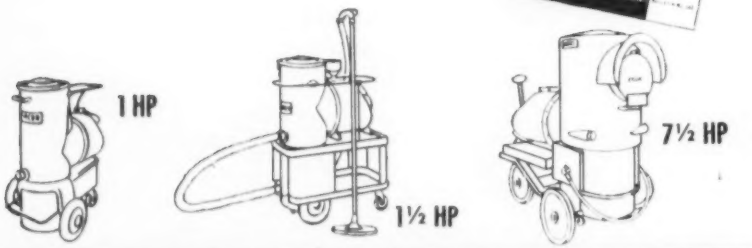
Bench work on delicate airplane instruments was speeded up by providing each worker with a special Spencer Vacuum tool with a hand valve as shown above. It is similar to the older method of providing a compressed air line for every bench except that all particles including the finest dust are collected in a container instead of being blown all over the room.

There are more than a hundred special uses for Spencer Vacuum in industrial plants. It will reclaim metals, pick up water, handle hot materials and even convey loose materials such as rice, chemical powders and foundry sand, by the ton.

Look over the 132 unusual uses for this new industrial tool, and remember that your plant housekeeping will be done better and faster, every night, with the same equipment.

Ask for Bulletin No. 144





THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

466-B

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 134)

ting edges touch the work, it is explained. This serves to reduce friction and power loss and the danger of kickback and to make faster, smoother cutting possible. The blades come in 10-, 12- and 14-in. dia to fit standard arbors, are suited for use with power feed attachments. Delta Power Tool Div., Rockwell Mfg. Co.

21—HEATING COILS offer improved heat transfer

This company's new Types S, SD, and HD Heating Coils feature corrosion resistant tubes, heavy-gage headers, double channel casing, double-walled tubes, continuous transfer surface, and reinforced cross-angles. Type S is designed for steam or hot water service; Type HD (heavy duty) for severe applications, and Type SD for steam distribution to coils. Type S is available in 11 widths and Types SD and HD come in five widths. Lengths of all types range from 12 in. to 120 in. Catalog 4553 gives further details. Young Radiator Co.

22—SERIES BALLAST designed for constant light output

This constant wattage series ballast for two 40-w rapid start lamps is said to deliver constant light output within ±2.5 per cent even though line voltage varies up to 20 per cent. Lumen output of the lamps averages 100 per cent,

according to manufacturer. The series circuit is designed to permit safe lamp changing while current is on, and the use of conventional bi-pin lamp holders. Catalog 254-621 gives full information. Jefferson Electric Co.

23—HARD VINYL for use in nameplates and tags

Lucoflex, a non-plasticized polyvinyl chloride plastic, resists the action of most solvents, brine and other corrosives, according to manufacturer, and thus presents a solution to the problem of keeping nameplates and instrument panels intact in corrosive environments. Its corrosion resistance and ease of coloring, shaping and decorating, suggest its use for nameplates.

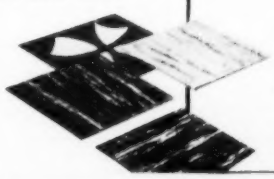
Because no plasticizers are used in the formation of Lucoflex, there can be no bleeding out of the plasticizer, it is noted, and the material retains its toughness and is unaffected by aging at elevated temperatures. Being non-

MONEY GOES DOWN EVERY TIME A FLOOR IS INSTALLED

That's why good management means choosing the *right* flooring for every installation. Because, flooring vitally affects your operating expenses... as well as the efficiency and morale of your staff.

And, it's good management to call on a Kentile, Inc. Flooring Contractor! He can bring to you the specialized knowledge and experience that means time, work and money saved on every kind of commercial, industrial and institutional flooring installation.

Be sure to call on him for whatever assistance you need... whether it is for new construction or the remodeling of existing facilities.



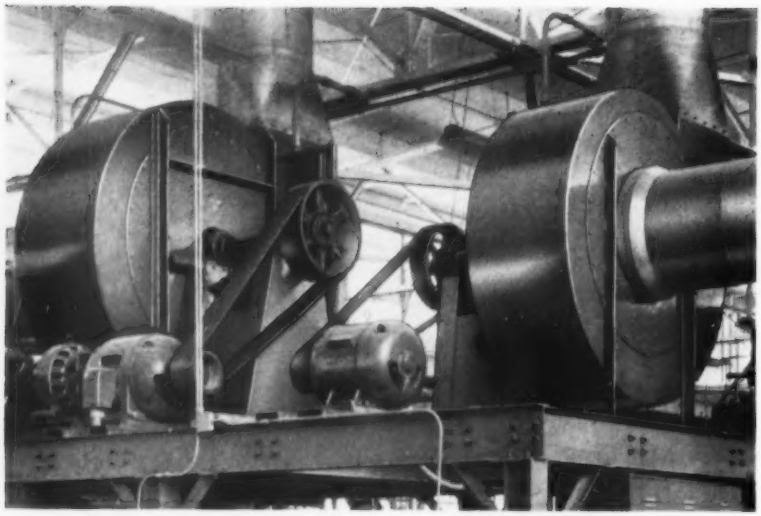
Call the Kentile, Inc. Flooring Contractor* for up-to-date information about these floors

- ✓ *KENTILE ASPHALT TILE*
- ✓ *KENCORK FLOORS AND WALLS*
- ✓ *KENRUBBER TILE FLOORS*
- ✓ *SPECIAL (greaseproof) KENTILE*
- ✓ *KENFLEX VINYL TILE*

KENTILE INC.

*If you don't know the name of your Kentile, Inc. Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

For more facts circle 588 on Reply Card



WHERE Bayley EXPERIENCE *Pays Off!*

Producing FANS for the Entire Field of Industrial Exhaust Ventilation

Vent Set For Fume Exhaust

From the largest heavy-duty exhauster for waste products disposal down to the smallest light-duty fans for fume or foul air exhaust, BAYLEY can supply equipment that is just right in type and capacity. And with Bayley experience to guide you, economies in design and setup will also be effected.

BAYLEY is the name to remember for advice on air-handling problems.

Write today for illustrated literature.

Bayley **BLOWER COMPANY**
Engineered Air-Handling Equipment
1825 S. 66th St. • Milwaukee 14, Wis.
For more facts circle 589 on Reply Card

NEW PRODUCTS

(Begins on page 134)

magnetic, non-galvanic and non-conductive, it is declared particularly suitable for electronic equipment identification tags. It has a metal-like machinability, can be fabricated by usual processes. American Lucoflex, Inc.

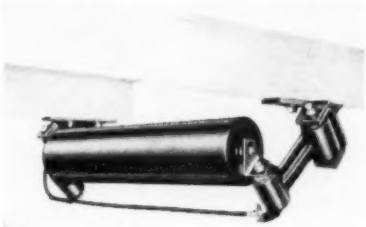
24—WARDROBE RACKS hold more coats and hats

Having twin hanger bars, the Double Checkerettes can take care of twice as many items, it is pointed out. The 3-ft model has a capacity of 48 coats and hats, and the 4-ft unit holds 64—in slightly over 4 sq ft of floor space. Coat hangers may be substituted for hooks with some loss of capacity, or combinations of hangers and hooks can be arranged since the double hooks which straddle the hanger bars can be snapped on or off.

The welded steel racks stand rigidly even under full load, company states; they can be knocked down for storage, set up without tools, nuts or bolts. Casters in the base make it possible to wheel the racks about, and by different arrangements of hat shelves and hanger bar the units can be adjusted to suit the length of the garments to be held. The racks are finished in gray enamel. Vogel-Peterson Co.

25—RETURN IDLER designed to prevent belt roving

Designed for automatic alignment for the return belt without the use of side guide idlers, the Rex Style 41 Roller-Bearing Belt Training Idler consists of a dead-shaft roller-bearing return roll, mounted at each end to a toggle-like arrangement of swivel arms. These are suspended from the conveyor framework at an angle of about 45 deg in the



direction of belt travel. Movement of the belt to one side results in increased weight on that side, which causes that end of the roll to move forward and downward. At the same time, the opposite end of the roll is moved backward and upward and this changing of the normal position of the roll with the belt serves to guide the belt back to central position.

Company says this action is equally effective on horizontal, inclined or declined conveyors, and the effect of build-up of material on the roll is negligible. This idler operates in one direction only. When installed, one of the idler units should be located close

Steam can KILL

Special tube assures extra long life.
Braided steel wire plies create tremendous strength and safety.
Spiral cord asbestos breaker ply makes heat-resistant bond between cover and carcass.
Extra-tough cover withstands external abrasion.
HY-TEST
STEAM HOSE

Tame it with HY-TEST Hose!

Hy-Test just *can't* burst and spray out live steam . . . steam that can scald and even kill! Here's why. Hy-Test hose is reinforced with several rubber-encased plies of closely-woven *braided-steel wire* that prevent sudden failure.

After long and severe service, harmless seepage through these blowout-proof plies provides ample warning of the need for replacement.

Add to this safety feature a specially-compounded steam-resistant inner tube, a breaker ply of spiraled asbestos cord that keeps the outer surface cool, and an extra tough, abrasion-resistant cover and you have a super-service, super-safe hose for superheated steam—Hy-Test steam hose! It's made to withstand working pressures up to 200 pounds.

Your local NYB&P Distributor can supply you with Hy-Test—and other superior quality steam hose for less severe service. Follow his advice for maximum hose value... with maximum safety!

Our Second Century of Service to Industry

Founded 1846 · NEW YORK BELTING & PACKING CO.

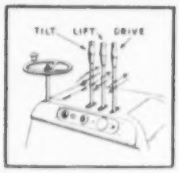
NEW YORK BELTING & PACKING CO.

America's Oldest Manufacturer of Industrial Rubber Products

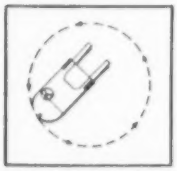
1 MARKET STREET—PASSAIC, NEW JERSEY

For more facts circle 590 on Reply Card

ONLY
MOBILIFT
STAND-UP FORK LIFT TRUCKS
Give You
LEV-R-MATIC DRIVE



• No Gears to Shift.
• Speeds All Movements.



MOBILIFT MOBILITY
• 360° Steering — ZERO Inner Turning Radius
• Excels in Close Quarters

MOBILIFT STAND-UPS
• Ample size platform.
• On and Off in Seconds.
• All Around Visibility.

Only MOBILIFT Stand-Up type Fork Lift Trucks give you Lev-R-Matic push-pull controls for forward-back, elevating, tilting...THERE ARE NO GEARS TO SHIFT!

Only MOBILIFTS give you MOBILIFT agility and quickness with their compact design, short over-all length, 360° steering and ZERO inner turning radius. They excel in congested areas.

Only MOBILIFTS give you perfected Stand-Up models—for *more* work, *faster* work, *less* operating expenses.

To these *plus* advantages add MOBILIFT air-cooled 3-cylinder engine's reliable power and easy accessibility for minimum service and repair....The answer is obvious:

YOU'LL ACCOMPLISH MORE, WORK FASTER, EARN MORE WITH MOBILIFT FORK LIFT TRUCKS. *Write for complete information.*

MOBILIFT Lev-R-Matic DRIVE
MOBILIFT CORPORATION
835 S. E. MAIN ST., PORTLAND 14, OREGON
2317 W. 18th, CHICAGO • 790 Patterson Ave., E. RUTHERFORD, N. J.
1113 Spring St. N. W., ATLANTA • 2724 Taylor St., DALLAS
2730 San Pablo Ave., BERKELEY

For more facts circle 591 on Reply Card

NEW PRODUCTS

(Begins on page 134)

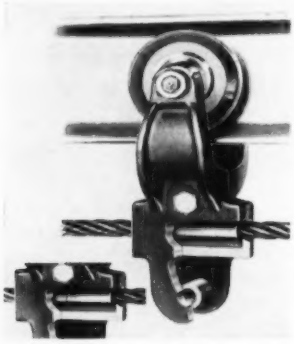
to the head pulley to immediately center the return belt, and one unit close to the tail pulley to center the belt for subsequent loading. Additional units are spaced as conditions warrant.

The Style 41 is furnished with standard 5- or 6-in. dia steel return rolls; another style, with 5½-in. rubber-covered spiral return roll, is available. Chain Belt Co. of Milwaukee.

To receive product data circle item numbers on the handy Reader Service Cards on pages 39-40 and 191-192.

26—CABLE CONVEYOR now has swaged bushings

This manufacturer's overhead trolley conveyor has been improved by the addition of Bush-Lock swaged bushings which lock the trollies on immovable centers. A two-piece trolley bolts over the cylindrical bushing which is permanently locked to preformed cable by high pressure swaging. Patented features announced include



multiple Bush-Lock assemblies on cables of 100 ft or less and the rotary floating trolley.

Since intermediate and splice pulleys are identical, it is easy to splice these cable conveyors, it is pointed out, adding, removing or replacing cable. At splices, the bushings on the end of each cable is half length, the trolley completing the splice. The Bush-Lock grips the cable with a strength equal to the ultimate strength of the cable itself. Load capacities and other data are provided in Bulletin 40. The E. W. Buschman Co.

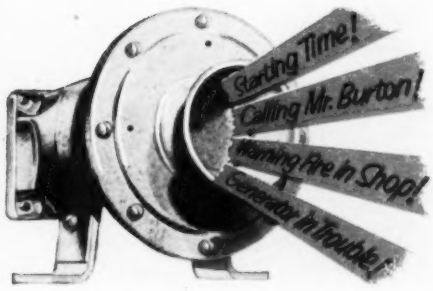
27—SAFETY GOGGLES to fit over prescription glasses

Designed to fit comfortably with ample clearance over modern large-frame prescription glasses, the Kover-Mor comes in a chipping style, with clear glass lenses, and in a welding style available with a choice of filter lens shades. Standard 50 mm round lenses

Tells you how to use Benjamin Sound Signals as

"The 20th Century Pony Express"

to Sound the Alarm against Production Enemies



Outwit today's most menacing threat to business, hidden costs! Alert your plant against production delays . . . stalled machines and flood, fire and sabotage hazards. To help you do this, Benjamin has gone to great expense to compile the most comprehensive industrial signal book ever produced—and now offers it to you, absolutely without charge!

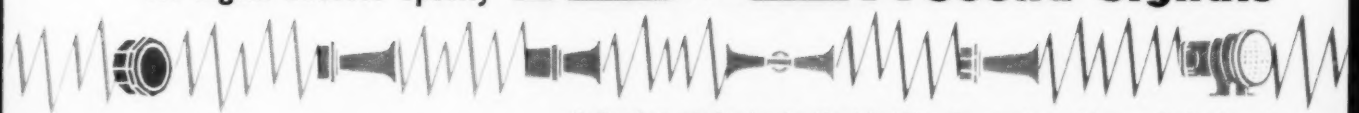
This authoritative book—containing the latest discoveries of leading sound signal engineers . . . is a "must" for every factory, mill, forge, machine shop, mine or warehouse, regardless of size.

Whether you use only one or two horns, buzzers, or sirens, or are considering a complete plant signalling system—whether remodeling your present building or planning a new one—or simply trying to better your signalling—you need this newest book for pointers and reference. It tells signalling uses you never dreamed of; describes applications that are solving problems similar to those that may be puzzling you.

Read in this book, how Benjamin is best qualified . . . through over a half-century's experience and a most advanced sound laboratory . . . to advise you on your signalling requirements—and why Benjamin signals are unique—vibrant—dominating over all competing noises.

Write for your free copy today. Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Ill.

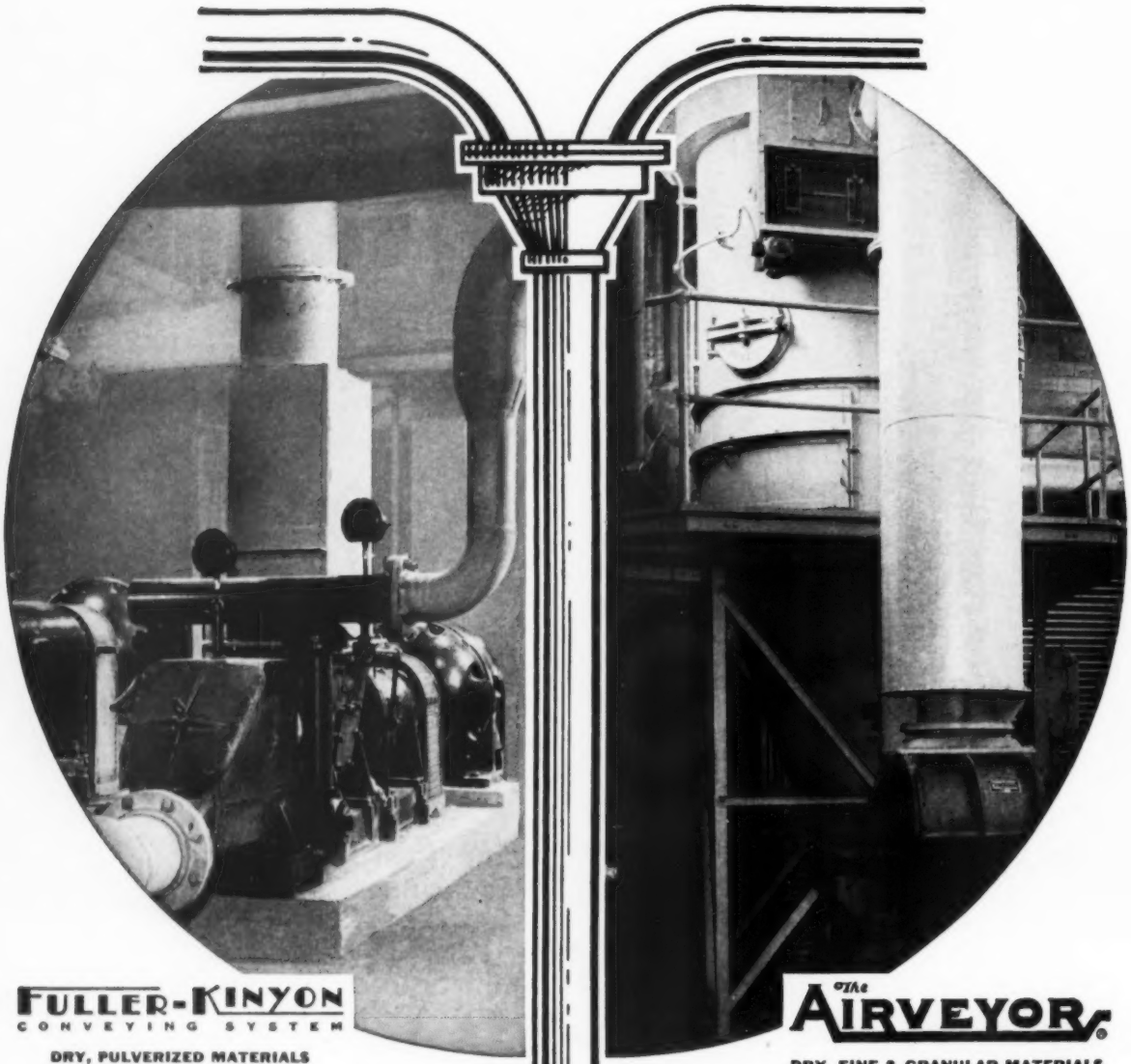
for Signal Success Specify BENJAMIN Sound Signals



A Product of Benjamin Electric Mfg. Co., makers of famous Benjamin and Leader Line lighting equipment and sound signals, for Industry, Institutions and Commerce.

G198

For more facts circle 592 on Reply Card



FULLER-KINYON
CONVEYING SYSTEM
DRY, PULVERIZED MATERIALS

The AIRVEYOR®
DRY, FINE & GRANULAR MATERIALS

CONVEY IT WITH AIR THROUGH PIPE LINES

Conveying of dry, pulverized, fine, and granular materials by air through pipe lines has many inherent advantages . . . unloading from carriers and delivering to storage, storage to processing points in the plant; it has made manual movement obsolete, inefficient, and costly.

Fuller Company designs and manufactures four basic types of air conveying systems, each with its own unique features, to meet specific requirements in your plant. Add to this, Fuller's 26 years of experience in all phases of materials handling by air, and you have a combination that's hard to beat.

With no obligation on your part, we will be glad to study your conveying problems, and offer recommendations, where appropriate, to show how Fuller conveying equipment can be applied to give you more convenient and efficient materials handling, and in addition, reduce costs.

BULLETIN G-1

This bulletin illustrates the four conveying systems built by us. It should be of particular interest to production men concerned with handling dry, pulverized and granular materials. Send for your copy, now!

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS AND ASSOCIATED EQUIPMENT

G-78
1817

Fuller

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St.—Chicago 3
420 Chancery Bldg.—San Francisco 4

For more facts circle 593 on Reply Card

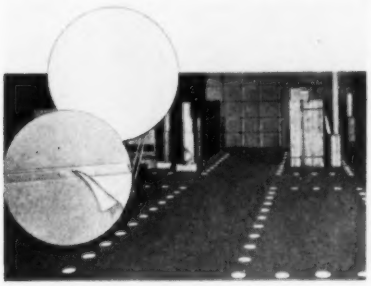
(Begins on page 134)

are used in both styles of the goggles.

In the Kover-Mor, lightweight molded nylon eye cups are used for toughness, non-flammability and low-heat conductivity. A rigid metal top bar is incorporated for adjustment to wearer's face and make the goggle easy to put on and take off with one hand. Slots in the lens retaining rings and screens in the eye cups provide two-way ventilation. Willson Products, Inc.

28—AISLE MARKERS are low priced, easy to apply

These markers are made of thin plastic backed with a pressure-sensitive adhesive. They come in four bright colors: yellow, red, green and white. Besides costing less and lasting longer than many types of aisle marking, these markers are easily applied. They stick to a clean, dry floor without moistening, and an unskilled worker can make



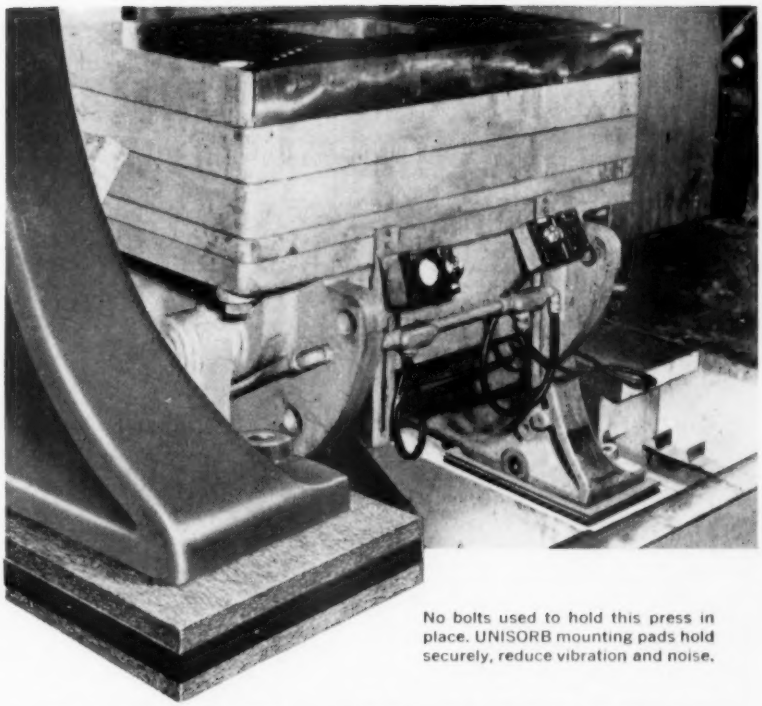
straight or curved lines with them. Production isn't disrupted and there's no clean up job afterward.

Being only 0.005-in. thick, the markers lie flush with the floor. Manufacturer says that acids, oil, grease, salts, water and most solvents have no effect on these markers. But if one does become damaged, it can be replaced without disturbing the others. Stock circular markers come in 2-, 3-, 4- and 5-in. dia sizes, and directional arrows are also available in four sizes. Each marker is mounted on a two-piece folded paper liner which is easily removed and serves to protect the adhesive until used. W. H. Brady Co.

29—PREHEAT CALCULATOR for welding hardenable steels

Recently re-issued in accordance with latest welding practices, this company's Welding Preheat and Interpass Temperature Calculator uses slide rule principles for quick and accurate calculation of the preheat and interpass temperature required when the hardening or cracking tendency of metal being welded can be minimized by preheating.

In some cases the best welds in high carbon and some alloy steels are obtained by using preheat, it is explained, and the amount varies with the chemical analysis of the metal and the



No bolts used to hold this press in place. UNISORB mounting pads hold securely, reduce vibration and noise.

BELOW-FLOOR MOUNTING

OF LARGE PRESS...

VIBRATION AND NOISE REDUCED WITH

UNISORB®

MOUNTING PADS

Studies in plant after plant, show that UNISORB mounting pads HOLD securely, even when used with gigantic machines.

And it's done without bolts, without costly floor drilling. You simply use the UNISORB pad recommended for the machine. Apply UNISORB cement, set the machine in place. Let the cement set and you're ready to roll.

The book about UNISORB tells the entire story, shows how easy it is to re-locate machines mounted the modern UNISORB way. For your free copy, return the coupon today.

UNISORB is also available pre-coated with adhesive, and is recommended for use only with machines that do not require shimming.

Look for the red center and UNISORB brand mark

The FELTERS Company

225 SOUTH STREET, BOSTON 11, MASS.

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RETURN COUPON NOW! At no obligation to me, please send a copy of "Why It Pays to Anchor Machines with UNISORB."

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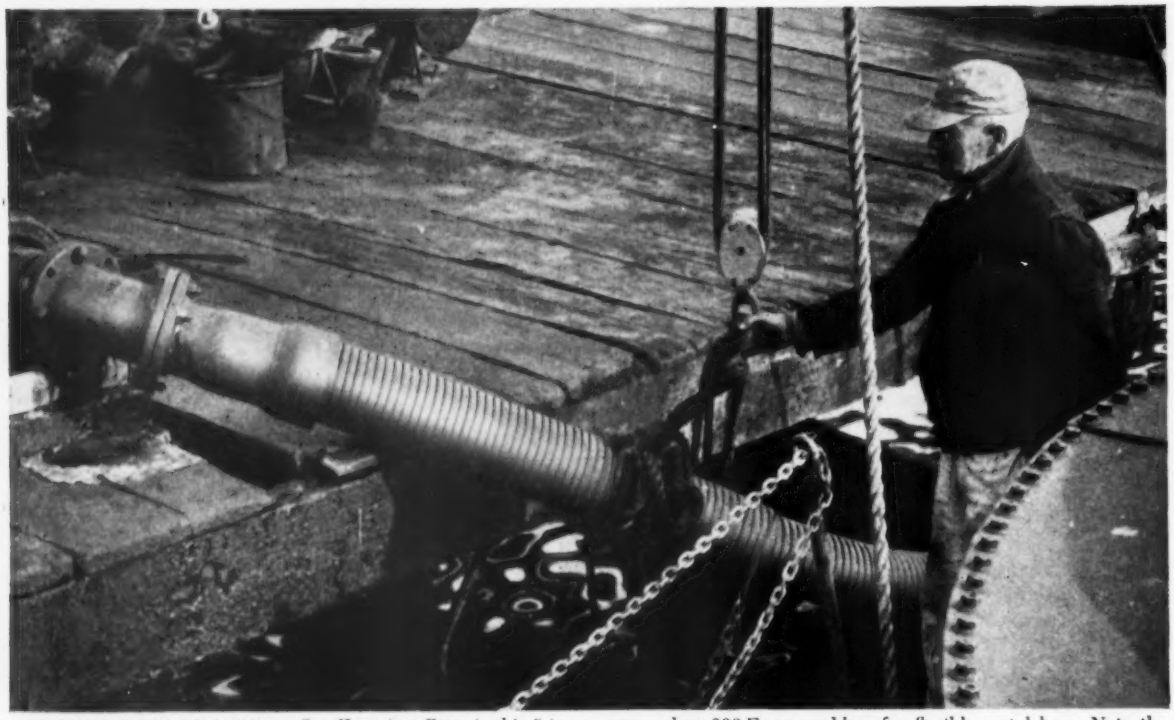
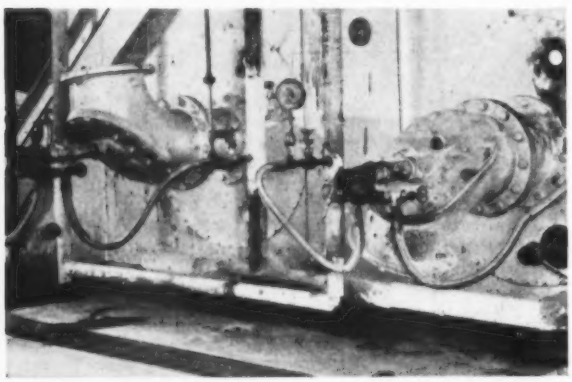
For more facts circle 594 on Reply Card

News about flexible metal hose and tubing

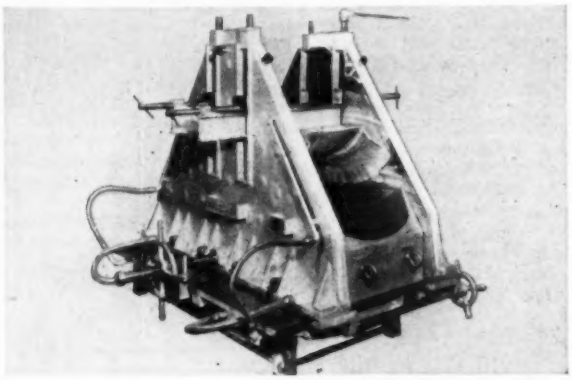
Here's why it's easier to design—produce—maintain with flexible metal connectors



HOT ASPHALT SHIP-TO-SHORE on San Francisco Bay via this 6-in. American Flexible Steel Hose which is carried by the barge "Maltha" operated by the United Towing Company. Asphalt is pumped at 300 F—no problem for flexible metal hose. Note the 7-in. hose used as a reinforcement at the dock end of 6-in. line for added protection against impact and abrasion.



WATER AND OIL DO MIX—if you do it under high temperatures and pressures as in these high-pressure boiler oil burners. Here, ¾-in. American Monel Seamless Flexible Tubing carries Bunker "C" oil at 300 psi and 200 F; the other carries steam at 135 psi and as high as 560 F to atomize the oil in the burners. These flexible metal connectors greatly simplify burner cleaning and servicing for one of the South's largest kraft pulp and paper mills.



THE EASY WAY to provide for movement of the steam and condensate lines to this tire mould made by Balloon Tire Mould Co., Inc. of Los Angeles, was to design it with American Flexible Seamless Bronze Tubing equipped with heatproof male fittings. Two ¾-in. lines and two ½-in. lines of Seamless Bronze Flexible Tubing carry 60 lb. of saturated steam and condensate to the movable side of the mould to supply heat for curing.

These are typical examples of how American Flexible Metal Hose and Seamless Tubing can improve design, speed production, simplify maintenance. You will find more in Catalog CC-400, along with specifications on both tubing and fittings. Write to *The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Co., Ltd.*

5213

ANACONDA

wherever connectors must move... American **flexible metal hose and tubing**

For more facts circle 595 on Reply Card

Save FLOOR SPACE by Using CEILING SPACE

It Pays to Move Materials the CEILING WAY

EVERY foot of your plant may be jammed with production equipment and your aisleways crowded with traffic—yet you may be wasting half of your floor area.

"Ridiculous," you say.

"A paradox," we reply, "until you take into account the possibilities of your ceiling space."

Transferring materials movement from floor to ceiling by use of Cleveland Tramrail overhead handling equipment can save a great amount of square footage and increase output tremendously without building expansion. This makes possible higher piling, reduction or elimination of aisleways, the reaching of hemmed-in areas and fast, uninterrupted deliveries.

Our engineers will be glad to offer suggestions how you can save floor space, without obligation.

Investigate the Possibilities of

CLEVELAND TRAMRAIL

... the Overhead Track to *Lower Production Costs*

Let us mail you this booklet. Packed with helpful data. Ask for No. 2008.

This large book is the greatest in its field. Contains a wealth of valuable information. Covers details of 91 outstanding installations. Has 252 large photos, 38 system layouts, 59 other sketches. Write for "Cleveland Tramrail at Work." A nearby representative will deliver it without obligation.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7597 EAST 284th ST. WICKLIFFE, OHIO

HOW MUCH is it costing you to Overlook OVERHEAD HANDLING as a means to ECONOMICAL OPERATION?

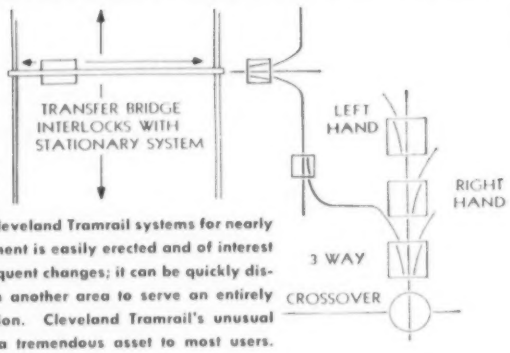
ADD up the hours of labor spent handling materials every day. Include the idle time of skilled workers and "down-time" of expensive machines waiting for materials to be moved. You will be amazed at the total hours lost. Cutting this just a small percentage will provide a large annual saving. Thousands of plants are increasing their profits in this area with Cleveland Tramrail equipment.

Read What a CLEVELAND TRAMRAIL SYSTEM Accomplished For These Companies . . .

SAVE 2½ HOURS ON EACH RUG ROLL HANDLED—A department store installed a Cleveland Tramrail system and slashed time for handling carpet rolls from box car to storage, to cutting floor, by 2 hours and 36 minutes per roll.

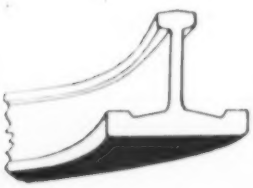
15% TIME SAVED OVERHAULING TRACTORS—Four 3-ton 50-foot motorized Tramrail cranes save 15% of the time formerly required by a large Caterpillar Distributor for overhauling tractors.

CLEVELAND TRAMRAIL ERECTION FLEXIBILITY A GREAT ASSET



Various track switches, interlocks, cross - overs, and other track features make it easy to develop Cleveland Tramrail systems for nearly any situation. The equipment is easily erected and of interest to plants encountering frequent changes; it can be quickly dismantled and re-erected in another area to serve an entirely different handling operation. Cleveland Tramrail's unusual flexibility of erection is a tremendous asset to most users.

LONG LIFE TRACK



Cleveland Tramrail track—either standard rail or arch beam—has a wear factor far beyond that generally obtainable elsewhere because, first, it is of high quality and hardness and second, it is provided with thick treads or wearing strips. Only after the treads are completely worn away will the lower flanges begin to peen and turn downward slowly. As a result, Tramrail track has many additional years of useful life.

Your CLEVELAND TRAMRAIL *Distributor*

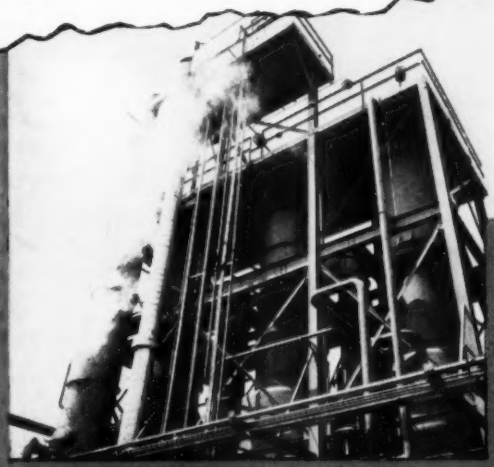
. . . is qualified to show you how to cut costs by OVERHEAD HANDLING

Year in and year out Cleveland Tramrail distributors work on materials handling problems in every conceivable type of plant and warehouse. They know from their vast experience how to solve them so as to obtain the greatest return per dollar invested in handling equipment. Cleveland Tramrail engineers in 55 cities in the United States and Canada will give you competent advice and handle your requirements completely from engineering layout to erection.

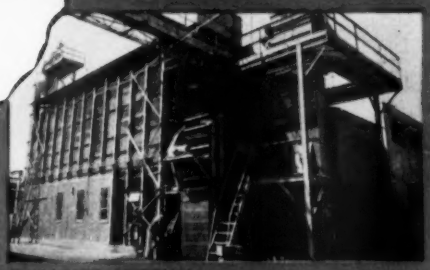
CLEVELAND TRAMRAIL DIVISION The CLEVELAND CRANE & ENGINEERING CO., Wickliffe, Ohio

Parlon Stays On!

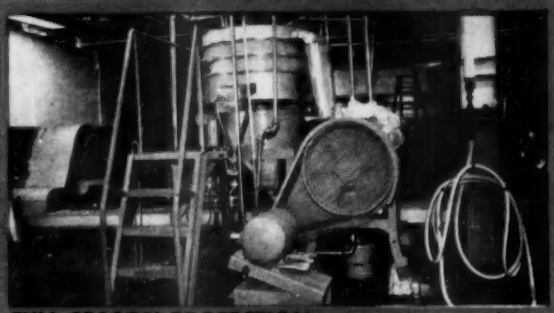
"...where other paints just couldn't take it..."



18 MONTHS EXPOSURE to moist salt air and frequent cleanings with caustic solution fail to harm Valdura, the Parlon-based finish used on evaporators at Golden Citrus Juices, Inc., Fullerton, California. Refinishing is not expected for at least another season. Mr. Willard Carle, master mechanic, says "This paint does a job where other type paints just couldn't take it." Valdura Parlon-based paints are manufactured by American-Marietta Company, Chicago, Illinois.



CLEANED WEEKLY with a caustic solution and live steam to remove accumulated citric acid, Valdura Parlon paint on fruit storage bins and fruit elevator permits full season operation without repainting at Golden Citrus Juices, Inc.



FULL SEASON PROTECTION is obtained for the juice finisher at Golden Citrus Juices, Inc., by painting with Valdura. Metal stairway and railing, motor housing, and belt guard are similarly protected. Cleaned with caustic solution weekly, the Parlon finish lasts a full season, whereas previous finishes failed after the first cleaning.

Of all maintenance paints tried by Golden Citrus Juices, Inc., Fullerton, California, only those made with Hercules® Parlon (chlorinated rubber) could stand up to weekly cleanings through the season with caustic solution and live steam.

Wherever protective coatings have to really take a beating from acids, alkalies, abrasion—not only in food processing, but in paper and textile mills, chemical plants, refineries, sewage disposal plants, and water works, ships, railroads—Parlon gives better service at lower long-term costs.

Parlon-based paints are easy to apply. They dry almost as fast as lacquer. And they can be used on any type of surface; make superior paints for concrete floors. See your regular supplier for details on Parlon-based paints, or write Hercules.

Cellulose Products Department **HERCULES POWDER COMPANY** *966 Market St., Wilmington 99, Del.*

LOOK FOR THIS LABEL ON THE PAINT CAN...

MADE WITH **Parlon®** HERCULES® CHLORINATED RUBBER

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

For more Facts circle 687 on Reply Card

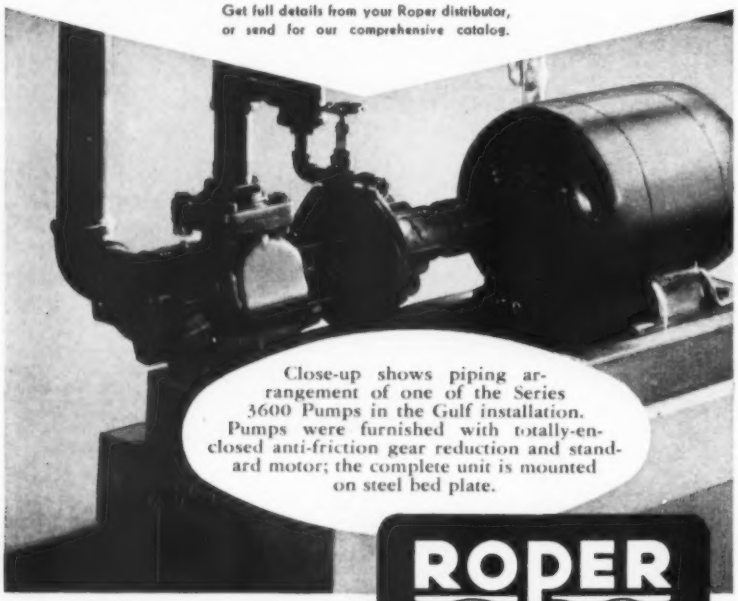
This time
GULF goes with ROPER

The Roper 3600...for General Purpose Pumping

This installation shows a battery of Roper 3600 MAHBRV Pumps in the Gulf Oil Corporation Packaging Plant at Charleston, S.C.

Widely recognized for dependability, these Ropers are designed to handle thick or thin liquids at slow speeds . . . are available in 40 to 300 G.P.M. sizes — pressures to 60 P.S.I. Self-lubrication, deep packing box, adjustable relief valve, hardened helical pumping gears, and high-lead bronze bearings are features that assure long service life; while quiet, smooth operation and high efficiency are performance qualities users appreciate.

Get full details from your Roper distributor, or send for our comprehensive catalog.



Close-up shows piping arrangement of one of the Series 3600 Pumps in the Gulf installation. Pumps were furnished with totally-enclosed anti-friction gear reduction and standard motor; the complete unit is mounted on steel bed plate.

GEO. D. ROPER CORPORATION
149 Blackhawk Park Avenue
Rockford, Illinois

ROPER
Rotary Pumps

For more facts circle 688 on Reply Card

NEW PRODUCTS

(Begins on page 134)

thickness. When the analysis and thickness are known, the calculator can give the amount of preheat required for a satisfactory welding procedure. The percentage present of such elements as carbon, manganese, etc., are worked into the calculation along with metal thickness from ½ to 10 in. The calculator costs about 50 cents in the United States, about 75 cents elsewhere. Lincoln Electric Co.

It's easy to obtain product data with the postage-free Reader Service Cards. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

30—12-INCH LATHE in turret, screw-cutting models

Heavy headstock, double V-belt outboard drive, massively-proportioned ball-bearing spindle, and convenient carriage are important features of this new 12-in. lathe. It has a 12-in. swing-over bed and saddle wings, 1-in. collet capacity, 1-⅜-in. spindle hole, and center distances of 23 and 35 in. Mounted on double rows of oversize, wide-spaced ball bearings at each end of the headstock, the spindle provides sustained accuracy through 16 speeds, from 38 to 1260 rpm, manufacturer points out, and the massive carriage has large dials, and a lever-operated disc-type clutch.

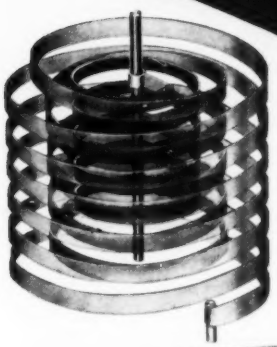
This lathe is designed to hog out heavy cuts, handle high speed production runs and hold sensitive tool room tolerances. Described as simple and safe to operate, the lathe is suggested as an effective instrument for training students. And it's said to offer economy in investment, maintenance, space, power. Logan Engineering Co.

31—CONTROLLER incorporates a motor-driven index

A controller especially adapted for cascade control system and for program control is announced. The instrument has a motor-driven index. Although not listed as a program controller, it is said to be extremely flexible for program control when equipped with proper externally connected accessories. It can be used for a cascade control system when the primary instrument is equipped with electrical contacts, making it suitable for remotely positioning a set point where air for pneumatic control is not always available.

The controller consists of a standard thermometer controller plus an index-setting mechanism that includes a reversible motor, a gear train, and two cam-actuated Micro switches. When its

Why the Weston sensing element is a MULTIPLE HELIX!

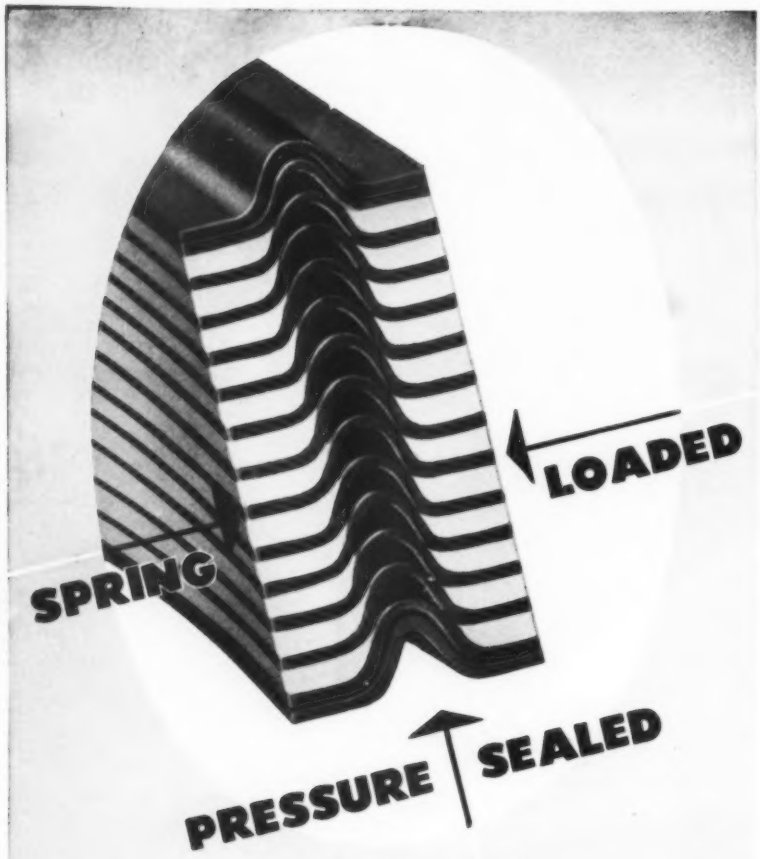


Exclusively in WESTON *all-metal* THERMOMETERS

Although WESTON provides sensing elements of various forms for special applications, the element in all standard WESTON Industrial Thermometers is a *multiple helix* as illustrated above. Why the more costly *multiple*, instead of the single, helix? *Just one reason.* WESTON's twenty years' experience producing bi-metal thermometers for industry has furnished convincing proof that the shorter, non-sagging *multiple* helix provides better accuracy, over longer periods. And while it provides other advantages, the one thing most thermometer buyers demand is long-term dependability. You get it, in extra measure, in WESTON Thermometers with *multiple* helix. WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

WESTON *Thermometers*

For more facts circle 596 on Reply Card



It's the live-spring action and U-shape of the metal plies in Ajax Spiralwound Gaskets that permits them to give and take with varying pipe line or boiler stresses, to seal joints tight at safe bolt loads and utilize the pressures they are sealing against to keep them tight under all operating conditions.

There are types and sizes for all standard flanges and for manholes, handholes and tube caps for all makes of stationary and marine boilers, waterwalls, economizers, etc.

Materials of construction include plated low carbon steel or stainless, Canadian or blue African asbestos or chemically inert duPont Teflon.

Sold universally through industrial distributors. Ask your supply house or write—

UNITED STATES GASKET COMPANY

FABRICATORS OF "TEFLON" & "KEL-F" FOR THE CHEMICAL PROCESS & ELECTRONIC INDUSTRIES

CAMDEN 1 NEW JERSEY

Representatives in Principal Cities Throughout the World

For more facts circle 597 on Reply Card

NEW PRODUCTS

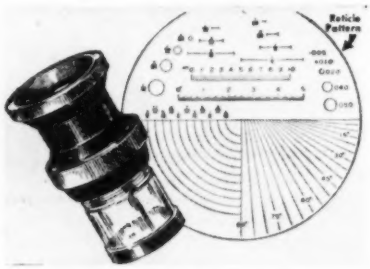
(Begins on page 134)

three color-coded indexes function to provide control action the green motor-driven index travels at a rate dependent upon the speed of the reversible motor; the red and purple indexes are limiting indexes, set manually to stop the motion of the driven index at predetermined points. Two external two-position knobs, on the front of the instrument case, provide means for setting the indexes. An additional button permits rapid resetting of the driven index to its starting position at any time during a program.

This type of controller is said to be particularly useful where programs must be varied from batch to batch. With the motor-driven index, a program can be established in a few seconds by adjusting the index setting knobs. Industrial Div., Minneapolis-Honeywell Regulator Co.

32—POCKET COMPARATOR for measuring small parts

Described as a cost-cutting quality control instrument, the Edscorp Pocket Comparator can be used to check layouts and machining on tools, dies, gauges, or to check threads, chambers and small holes. It is also used in optical work; for determining width of spectrograph lines; and in photography. Only about 1-½ in. by 2 in. in size, the comparator gives 6-power magnification. Its reticle is calibrated to measure angles, radii, circles and linear dimensions, in both decimal inches and millimeters. The instrument comes in a leather case and costs $22.50. Edmund Scientific Corp.



33—STEEL CLIP protects toes against falling objects

While maintaining that there is no better foot protection than steel-toed safety shoes, this manufacturer points out that some persons cannot or will not wear them—and for such persons the Sta-Safe Toe Clip is offered. It is a low cost, steel shield with nailing holes. To use it, you tighten the clip in a vise until the clip is the desired size. Then you place it over any square-toed or bulldog type shoe and nail it into place. The clip is also available with a spring and wire mounting for intermittent wear.

This clip is thus suggested, not only

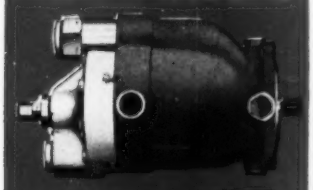
PUMPS

for INDUSTRY

HYDRECO

GEAR TYPE PUMPS

Reversible and non-reversible. Gear type pumps in exclusive FOUR-BOLT design . . . capacities from .5 to 130 gpm and operating pressures to 1500 psi . . . flange or foot mounted . . . furnished with keyed shaft with spline shafts optional. Also dual and tandem models.



STRATOPOWER

PISTON TYPE PUMPS

Axial reciprocating piston type . . . constant or variable delivery with capacities of .25 to 10 gpm at nominal speeds of 1500 rpm with maximum of 4500 rpm . . . working pressures to 3000 psi . . . direct engine and individual electric motor driven models.

KINNEY

VACUUM PUMPS

Single stage models to produce absolute pressure readings of 10 microns (.01 mm Hg.) . . . compound pumps producing readings of .2 microns (.0002 mm Hg.) or better. These Kinney High Vacuum Pumps are available in sizes for laboratory as well as high production use.

FLUID POWER PUMPS

The most comprehensive range of types, capacities and pressures in Hydraulic Pumps for industrial equipment, presses, machine tools, materials handling, metal working, mining, petroleum, gas and aviation applications. Hydraulic Motors, Cylinders and Valves to develop complete Hydraulic circuits.

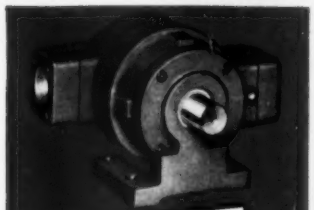
LIQUID HANDLING PUMPS

An exceptionally broad range of types, sizes and special constructions to handle virtually "any substance that will flow through a pipe" including: syrups, acids, sludges, slurries, asphalt, bunker fuel, etc.

VACUUM PUMPS

High Vacuum Pumps for laboratory, electronic, atomic research, biological and other chemical processing, vacuum refining of metals, de-aerating, dehydration, vacuum drying, refrigeration, etc.

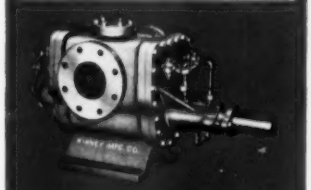
Write for full information ➡



DUDCO

DUAL VANE TYPE PUMPS

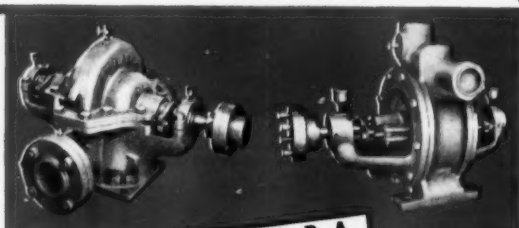
DUDCO Pumps provide a broad range of sizes with capacities to 120 gpm and pressures to 2000 psi. Also available in dual units operating from a single drive. Hydraulic motors with starting torque outputs to 14,000 lb. in.



KINNEY

LIQUID HANDLING PUMPS

A complete range of sizes in Rotating Plunger and Herringbone Gear Pumps to handle light or heavy liquids from gasoline to molasses. Available in plain or steam jacketed models.



AURORA

CENTRIFUGAL & TURBINE PUMPS

Deep well, sump, drainage and condensation return units, household water systems. Industrial low and high pressure liquid handling pumps. Direct motor and countershaft driven horizontal and vertical models. Capacities 3 to 7500 gpm.

THE NEW YORK AIR BRAKE COMPANY
230 Park Ave., Dept. PE, New York 17, N. Y.

Gentlemen: Kindly send additional information on the pumps I have checked.

☐ Hydreco Pumps
☐ Stratopower Pumps
☐ Dudco Pumps
☐ Kinney Liquid Handling Pumps
☐ Kinney Vacuum Pumps
☐ Aurora Pumps

Name_____

Address_____

City_____ State_____

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.

For more facts circle 598 on Reply Card

TENNANT the sweeper that...

Tennant Model 36 Power Sweeper sweeping floors in famed turbo-jet plant of A. V. Roe Canada Ltd., Malton, Ontario.

...does the work of a CREW

Due to EXCLUSIVE engineering features, one TENNANT Power Sweeper usually replaces a 3 to 12-man pushbroom crew . . . and does a far cleaner sweeping job besides.

This explains why so many firms have *fleets* of several TENNANT Sweepers. Each machine promptly *pays for itself* in labor costs alone, usually in 90 days or so. And, thanks to superb construction, they stay on the job . . . usually for *years.*

THESE FEATURES CUT SWEEPING COSTS

Speed and maneuverability are expertly combined in a TENNANT Sweeper . . .

Instant reverse avoids hand shifting; one pedal for forward and reverse.

"On-a-dime" turns mean faster work in tight corners.

Large capacity, exceeds 90,000 sq. ft. per hour . . . covers 36" to 48" path. Gas or electric. (Smaller model sweeps 24" path.)

WRITE TODAY for free "Cost Savings Graph" for estimating possible savings with mechanized sweeping. Also illustrated bulletins on sweeper performance.

Tennant Electric Sweeper is quiet, dependable, sweeps full shift on one charge.

Tennant "24" Sweeper is fast and streamlined . . . ideal for narrow aisles. Big sweeper features.

TENNANT Established 1870

G. H. TENNANT CO.
2572 N. Second St.
Minneapolis 11, Minn.

HEAVY-DUTY INDUSTRIAL
POWER SWEEPERS

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 134)

for the truculent employee, but also for the temporary worker for whom safety shoes are a costly investment, and the crippled worker whose foot deformity makes ordering of safety shoes a difficult problem. Standard Safety Equipment Co.

34—SCOOP for hydraulically-powered fork lift trucks

For use on any of this company's hydraulically-powered fork trucks, this attachment is designed to handle fine coal, salt, sulfur, grain, or other bulk materials in which the lumps are not large. The scoop gets its hydraulic power from the same system which operates the lift and tilt on the vehicle.

Outstanding characteristics announced for this 3200-lb capacity scoop are anti-friction bearings supporting the trunnions, a replaceable wear strip on the lip, and a double-acting hydraulic cylinder which moves the unit from loading to carrying position. Over-all width of the scoop is 37⅜ in.; its cubic content is 25 cu ft. The Elwell-Parker Electric Co.

35—SPRAY GUN is a self-contained portable unit

Powered by low-cost CO_2 cartridges, the Model 53 self-contained spray gun needs no compressor, hose or electrical connections. A removable nozzle adapts to spray anything from paints to insecticides, from a fine mist to a stream, manufacturer says. Each CO_2 cartridge will spray up to a container-full (21 oz) depending on the viscosity of the fluid used.

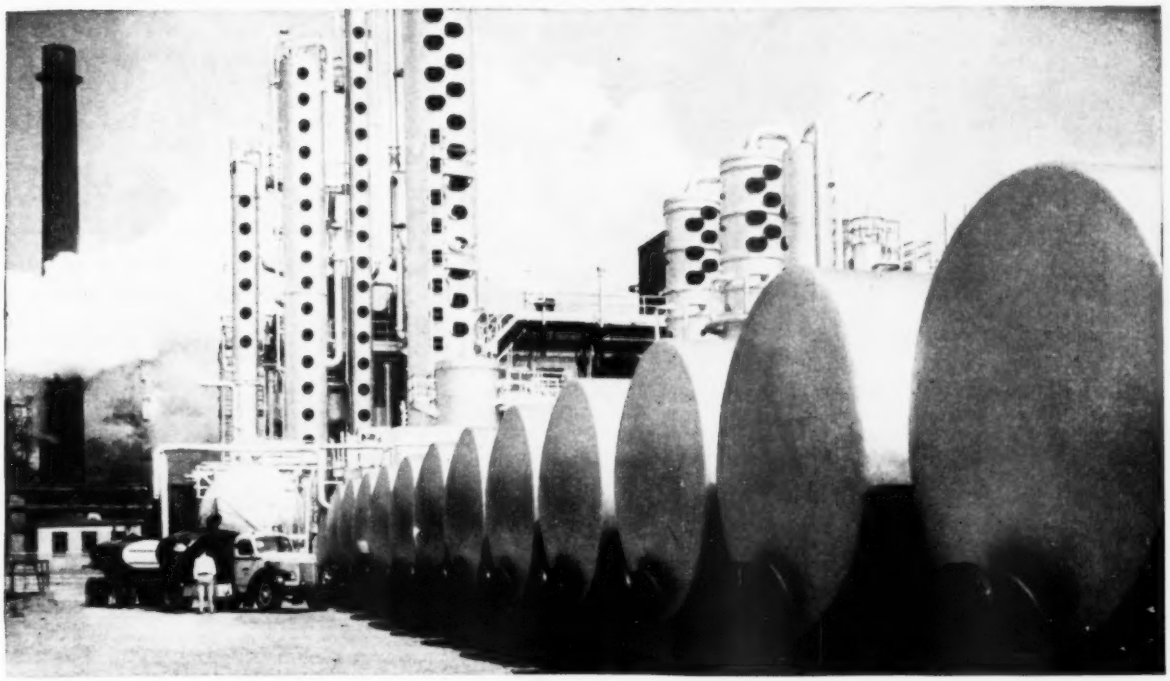
An improved model of company's former unit, this new spray gun is available with an attachment fitting into the handle so that the unit can be pressurized by a conventional air line for spraying solutions atomizing at low pressure, (approximately 120 psi). It is pointed out that the gun is easy to re-load and accessory nozzles can be substituted even while it is charged. Sullivan-Becker Co.

36—SELF-DUMPING HOPPER has double-purpose base

A base that permits moving with either a jack-tongue or a fork type lift truck is incorporated in this self-dumping hopper. It is designed to allow more efficient scheduling of fork trucks and to reduce downtime. A machine worker can move this hopper as he needs to, without waiting until a lift truck is free. All he has to do is insert the jack tongue in the socket on the hopper

TANKS PREPARED FOR ALCOHOL STORAGE BY CHEMICAL CLEANING

Dowell Service removed all traces of oil after mechanical cleaning method failed



Can you imagine cleaning out oil storage tanks so well that they could be used to store a product such as alcohol, which is so easily discolored by oil and grease?

That's exactly what Dowell did for a customer who wanted to convert three 350,000 gallon tanks from oil to alcohol storage.

Previous attempts to clean the tanks by sand blasting had not been satisfactory. And there was particular difficulty in cleaning behind the overlapping plates of one riveted tank.

Dowell Service did the job in about 10 hours per tank with this result: *the tanks were completely free from oil and grease.* Dowell furnished all trained personnel, chemical solvents, high pressure jets, pump trucks and controls.

Tank cleaning, including removal of paint from external surfaces, is just one of hundreds of applications for Dowell Service using chemicals for maintenance cleaning. For complete information and estimates on the cleaning of your equipment, call the nearest Dowell office, or write directly to Tulsa, Dept. I-27.

DOWELL SERVICE

Over 100 Offices to Serve You with Chemical Cleaning for:

Boilers · Condensers · Heat Exchangers · Cooling Systems
Pipe Lines · Piping Systems · Gas Washers · Process Towers
Process Equipment · Evaporators · Filter Beds · Tanks

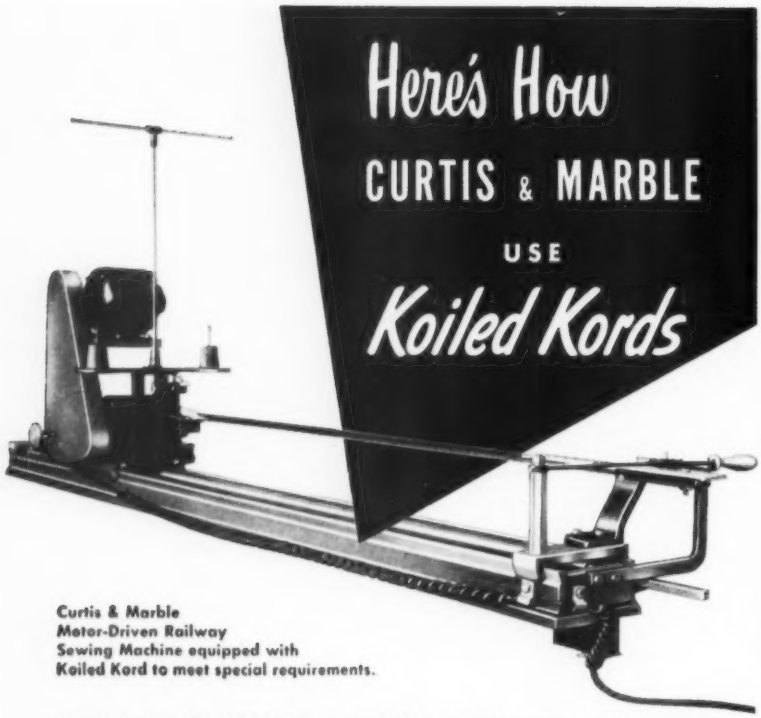
Chemical Services for Oil, Gas and Water Wells

DOWELL INCORPORATED · TULSA 1, OKLAHOMA

DOWELL

A Service Subsidiary of
THE DOW CHEMICAL COMPANY

For more facts circle 600 on Reply Card



Curtis & Marble Motor-Driven Railway Sewing Machine equipped with Koiled Kord to meet special requirements.

The Koiled Kord E-X-T-E-N-D-S as needed in delivering power to the motor of the Curtis & Marble Railway Sewing Machine. Does it smoothly and without strain too, as the motor moves the sewing machine head the full length of the "way". The Koiled Kord retracts to a neat out-of-the-way coil as the motor returns to position and tension is released.

The cord used on this equipment is an Underwriters' Laboratories Approved two conductor #18 SV cord with neoprene jacket. Koiled Kords are also available in #18 and #16 Type SJO and in #14 and #12 Type SO with 2, 3 and 4 conductors. Larger and smaller Koiled Kords can be furnished for special applications.

Koiled Kords are economical for use where power must be furnished to moving parts because they last longer than conventional cords which fail as a result of the repeated flexing and mechanical damage encountered in this type of application.

Koiled Kords minimize accidents because they stay out of the way. Koiled Kords S-T-R-E-T-C-H as far (up to 5 times retracted length) as moving parts require. Koiled Kords eliminate hazards from long, floor-dragging cords, BECAUSE they always retract to their original length.

For safe, dependable electrical connections on installations that MOVE, specify Koiled Kords.

Write for booklet 1052-G that shows how others have used Koiled Kords to advantage.

Koiled Kords
INCORPORATED
BOX K, HAMDEN, CONN.
IN CANADA: **R. D. FLECK & CO., LTD.**
OSHAWA, ONTARIO

For more facts circle 601 on Reply Card

NEW PRODUCTS

(Begins on page 134)

base and wheel the loaded container to the desired place, replacing it with an empty hopper.

Truck trips can be charted smoothly, it is pointed out, because the driver can follow a regular schedule—dropping off an empty hopper when he picks up a full one. The double-duty feature is accomplished by adding wheels to the base of the hopper. This feature is available with company's hoppers of ½- to 2-yd capacity. Roura Iron Works, Inc.

To receive product data circle item numbers on the handy Reader Service Cards on pages 39-40 and 191-192.

37—IMPACT WRENCH works fast and handles easily

Here's a new ½-in. square drive electric impact wrench which can be used with a variety of sockets and attachments. With it, series of nuts can be removed or installed in a fraction of the time required by hand tools, says manufacturer, and with no effort on the part of the operator. The wrench can also be used for driving gear pullers, stud removers, screw driver bits, hole saws, structural reamers, and steel, wood or mortar bits.

After a certain torque is reached the rotary action of the heavy-duty motor is transferred through the impact mechanism to sharp, powerful blows at

the drive spindle. The blows become heavier as the torque increases, it is explained—the larger the nut, the heavier turning impact. The wrench is designed to deliver up to 2000 rotary blows a minute, and as there is no direct connection, the motor runs continuously. Company says none of the torque is transmitted to the operator, and this means easy one-hand operation. Forward or reverse action, with or without motor running, is obtained by twisting the end cap.

Planetary reduction gearing is used

PROOF OF *Quality . . .*

OVER 1 MILLION DURKEE-ATWOOD V-BELTS

USED BY

SPEED QUEEN CORP.

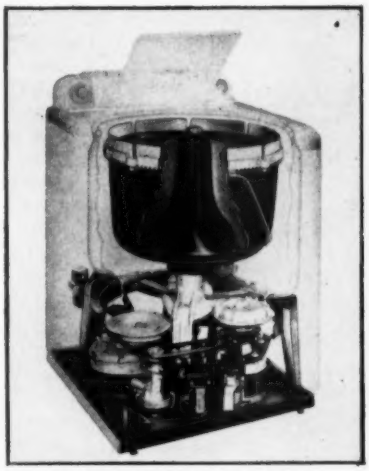
SPEED QUEEN

AUTOMATIC WASHERS AND CLOTHES DRYERS

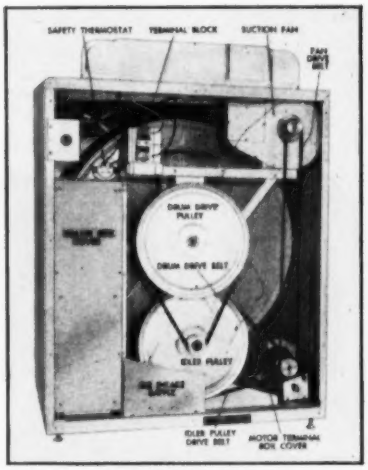
Speed Queen Corporation, nationally-known home laundry equipment specialists use Durkee-Atwood V-Belts in their two newest products, the automatic washer and automatic clothes dryer.

Years of dependable performance on their popular line of wringer washers and ironers prompted the company to choose Durkee-Atwood V-Belts when they introduced the two newest members of the Speed Queen Royal Family.

FINE NEW SPEED QUEEN AUTOMATIC APPLIANCES POWERED WITH D-A NOTCHED V-BELT DRIVES



AUTOMATIC WASHER



AUTOMATIC CLOTHES DRYER

Manufactured by
Speed Queen Corp., Ripon, Wis.

DURKEE-ATWOOD CO.
Dept. PLE-9, Minneapolis 13, Minn. Telephone MAin 0441

DURKEE ATWOOD V-BELTS

DA PRODUCTS SINCE 1910

Form No. 561

For more facts circle 602 on Reply Card

CUSHIONED DRIVES

In multiplied thousands of industrial applications where electric motors or internal combustion engines power vital production machinery, Twin Disc HYDRO-SHEAVE Drives serve as a *cushion to production.*

Wherever production operations involve jarring, jolting starts and stops and jam-ups, the *even* acceleration, *sustained* smoothness of operation and shock-load protection provided by HYDRO-SHEAVE result in steadier, more uniform, high-quality production, with sharply reduced downtime.

Easy as a sheave to apply, it offers all the advantages of the famous *Twin Disc double circuit hydraulic coupling.* HYDRO-SHEAVE eliminates the solid connection between the power source and driven equipment . . . protects both against shock loads, starting loads and overloads . . . and prevents stalls or excessive current consumption. In many instances, HYDRO-SHEAVE allows the use of motors which fit the actual *running* requirements of the job.

Contact your nearby Authorized Twin Disc Hydraulic Dealer—ask for Bulletin No. 145-B.

Designed for engines and motors of ¼ to 50 hp, compact Twin Disc HYDRO-SHEAVE® Drive slips easily on output shaft.

® T. M. REG.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

For more facts circle 603 on Reply Card

NEW PRODUCTS

(Begins on page 134)

for reducing motor speed, and both gears and impact mechanism are housed in the forward section of the tool where they are easily removed for cleaning. The tool is 10⅛ in. long, comes in two models, one for 115-v, the other for 220-v operation. Snap-on Tools Corp.

38—VOLTAGE TESTER is designed for greater safety

An all-new voltage tester will show nominal line voltages from 110 to 550 a-c, and 110 to 600 d-c. It will distinguish between a-c and d-c and show polarity of d-c lines. The unit is designed for use by electricians, maintenance men and electrical contractors.

Testing of voltages up to 600 v requires a high margin of safety in instruments of this kind. The tester has been designed with this feature foremost and

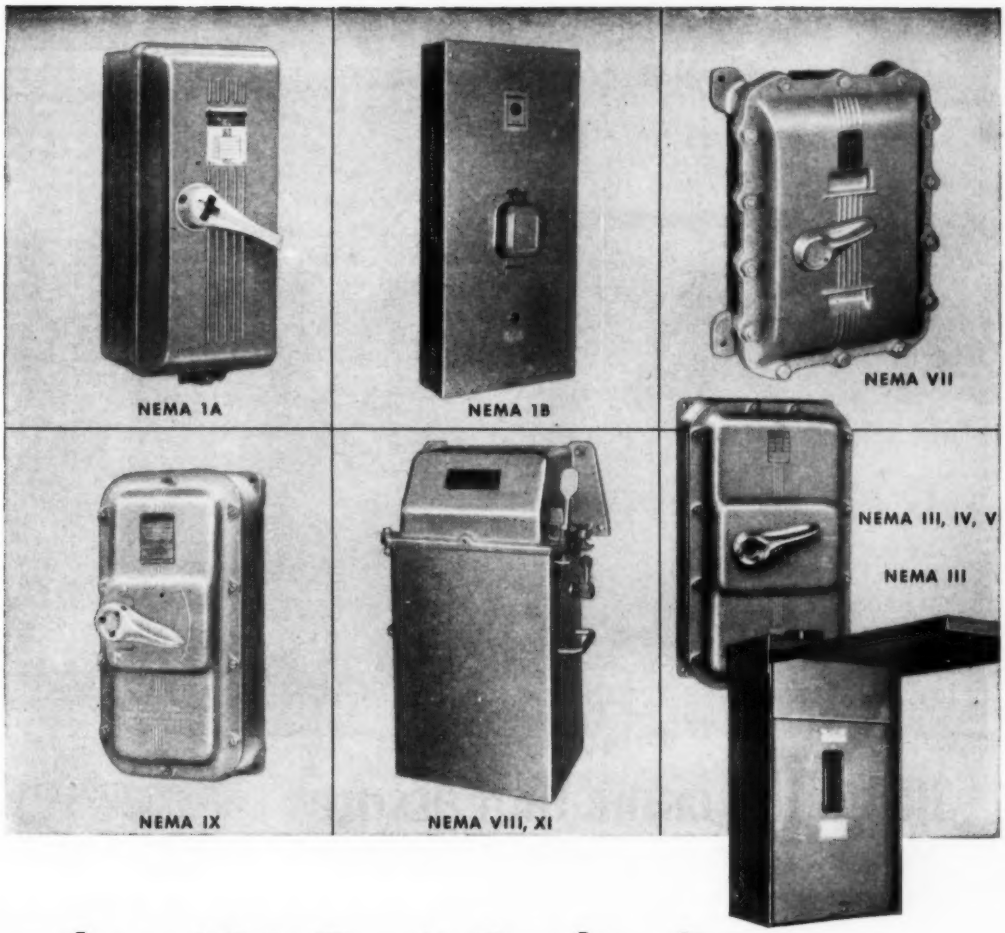
has many unique safety factors. Prod handles are integrally molded to neoprene insulated leads and include tip insulation and safety rings.

The one piece, plastic case is enclosed to keep out dust and foreign matter. Interior construction features a solenoid coil, layer-wound on a one-piece nylon spool. The coil is secured at both ends to prevent movement within the case. Coil leads have been isolated to avoid "cross-overs" and possibility of shorts. A Neon lamp in parallel with the solenoid provides a double check on circuits.

Convenient use-features include prod storage wells, which completely conceal sharp tips; a socket in which either prod can be mounted for easy handling. Ideal Industries.

39—PIPE WRENCH grips—but goes easy on chrome

Although it has a vise-like grip, this wrench can't mar chrome pipe and won't crush old piping, says its manufacturer. It's adjustable to accommodate phosfor bronze jawlines to fit pipe dimensions from ½- to 1½-in. It also locks in position, with a release lever which opens the wrench and frees the pipe when desired. A knurled screw-adjustment tightens so that the phosfor bronze liners are set in position against inner studs to prevent movement of the liners, and the jaws are adaptable for hex insets to handle nuts



This complete AB-I Circuit Breaker line

solves all your application problems

Here's how to wrap up every circuit protection problem in your plant—with the complete line of enclosed Westinghouse AB-I Circuit Breakers.

As shown above, there's an AB-I Breaker for *every* operating condition—indoors and outdoors, in wet and dusty locations, in explosive or corrosive vapors and dusts. It's a simple matter to select the right NEMA enclosure for any application. Ends shopping around for "specials"—saves you time and money.

AB-I's relieve you of many worries. They reduce downtime as much as 98%* compared with fused devices—eliminate the hazards of fuse bridging, too. They save on maintenance—no replacement parts needed. They end unnecessary power outages with inverse-time-delay tripping action. And they protect workmen from live parts and costly accidents.

For more information on how AB-I Circuit Breakers can help you, call your Westinghouse Representative or write for B-5456, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-30142-A

*Name of company on request

YOU CAN BE SURE... IF IT'S

Westinghouse

For more facts circle 604 on Reply Card

WHITING
Engineered
OVERHEAD CRANES

Here's the crane that assures
97.5% DRIVE EFFICIENCY

Full Vision Cab With Magnetic Control—Provides a clear view of entire working area. Whiting design magnetic control assures smooth acceleration, improved accuracy, more protection for motors.

Herringbone Type Gears—Used by Whiting on all high speed reductions of drive units and in second reduction of hoist units for longer gear life, less impact and shock, improved lubrication!

5 to 450 Tons Capacity! Whiting cranes cover the full range of handling needs for all industries. This 115 ton capacity Whiting Crane is used in steel mill service.

The double reduction drive, designed and used by Whiting on cranes up to 50 tons in capacity, provides an overall drive efficiency of 97.5 per cent . . . much higher than triple reduction types. Elimination of excess dead weight reduces power requirements and cuts operating costs. Single, easy to remove housing simplifies maintenance of entire drive unit!

In every Whiting crane, from hook to bridge end truck, you get the proved advantages of applied experience in crane manufacture . . . for handling power that's safer, longer lasting, easier to use and to service. Whether you're lifting 5 tons or 450 tons, Whiting can help you . . . write for complete information today!

WHITING CORPORATION
15697 Lathrop Avenue, Harvey, Illinois

Other Whiting Material Handling Equipment:
The Whiting Trackmobile,
Trambeam Overhead Handling Systems,
Whiting Electric Chain Hoists.

For more facts circle 605 on Reply Card

NEW PRODUCTS

(Begins on page 134)

and bolts. Company says this wrench needs no change of grip to lighten or loosen thread. Robert Austin Corp.

40—SAFETY GLASSES with plastic retracting temples

Now available on several models of this manufacturer's Eye-Savers are plastic Retrax Temples. These "telescope" to fit the wearer; they can be lengthened or shortened to accommodate the distance between eye and ear. And the hook end, which goes around the ear, features a "ball chain" design intended to "fit into" the cartilage contour behind the ear and prevent soreness there. Also, being plastic, the temples are light in weight and adjustable to the shape of the ear. It is noted that the new style temple affords a comfortable fit for all, without the need for stocking frames with temples of different lengths. Watchemoket Optical Co.

41—STEEL RACK handles drums easily and safely

Designed for one-man operation, even with a 750 lb drum, this all-steel rack can be assembled with pliers and a hammer. In use, the rack is simply placed alongside a drum, two drum hooks are fitted over the top chime of

the drum, and the drum is tilted into position. It is not necessary to tip the drum to insert clips underneath. The rack has a telescoping handle to give added leverage and stability. Four steel rollers are available as optional equipment to facilitate moving drums. Baker-Roos, Inc.

42—BENCH CLAMP develops 15 tons of squeeze

Holding polished chrome plated steel piston rods tight at over 15 tons of clamping pressure to permit fast assembly of piston and followers to the rod is claimed possible with this clamping device. A small hydraulic pump operating at only 250 psi powers it. The clamping pressure is obtained by the use of company's 5-in. bore fluid pressure booster with a booster ratio of 6.25 to 1 driving a 5-in. bore

Stuffingbox troubles go out when a BJ Mechanical Seal goes in!

BJ

MECHANICAL SEALS

for centrifugal pumps. Reliable, easy to install and maintain

- ★ **Lower maintenance costs**
- ★ **No repacking problems**
- ★ **No unnecessary downtime**
- ★ **Minimize leakage and loss of pumped liquid**
- ★ **Stop contamination of pumped liquid**
- ★ **Minimize hazards of volatile or corrosive liquid handling**

Now a complete BJ MECHANICAL SEAL SERVICE

ANY MAKE OF PUMP ★ Byron Jackson now designs and builds mechanical seals for all makes and types of centrifugal pumps . . . not just BJ pumps.

ANY PUMPING SERVICE ★ Byron Jackson provides the *engineered answer* to your mechanical seal need—recommends the correct type of seal and proper materials for your pumping service.

ANYWHERE ★ Byron Jackson Co. maintains sales offices throughout the United States and Canada and can give prompt assistance on mechanical seal problems. BJ also maintains *complete stocks* of mechanical seal parts at strategic points.

FILM

FILM AVAILABLE ★ Byron Jackson has a full-color educational film describing the theory, purpose, use, construction, and maintenance of mechanical seals. This factual film is available for showing to company engineering and maintenance meetings. Write direct to L. C. Kimball, Byron Jackson Co., Los Angeles 54, California.

If you have stuffingbox troubles... involving frequent maintenance, costly waste or contamination of pumped liquid, or hazards caused by volatile or corrosive liquids, contact the BJ Mechanical Seal Department or any BJ Pump Sales office.

SEND COUPON FOR THESE INFORMATIVE BULLETINS...

A. Film Condensation . . . photo story of mechanical seal taken from film. Bulletin No. 153-10000.

B. Instruction Manual . . . provides installation, operation and maintenance instructions for Type U seal. Bulletin No. 52-10100.

C. General Bulletin . . . illustrates and describes three basic BJ types of BJ Mechanical Seals. Bulletin No. 52-10000.

Byron Jackson Co., *Since 1872*
P. O. Box 2017, Terminal Annex
Los Angeles 54, California

Please send bulletins checked.

P153-10000. ☐ P52-10100. ☐ P52-10000. ☐

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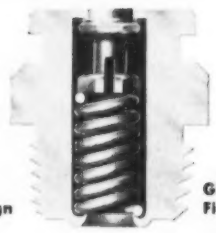
There's All the Difference in the World in Grease Fittings!

UNIVERSAL

Specify UNIVERSAL'S

New Giant Button Head or Flush Type Fittings

Streamlined One-Piece Design



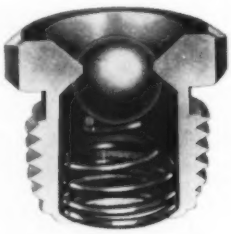
Giant Button Head Fitting, Plug Check

One-piece streamlined construction provides ample protection from damage by accidental blows. Positive seating of ball or plug check, supported by small but powerful spring, controls back-pressure and prevents leakage. Special spring design assures maximum clearance for free passage of grease.

When you need grease fittings for original equipment or replacement, specify UNIVERSAL and get a **better** fitting at no greater cost.

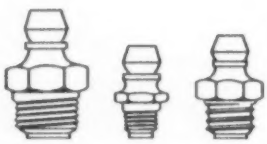
Application engineering available promptly on request. Write now for complete information.

Streamlined One-piece Design



Giant Flush-Type Fitting, Ball Check

Complete Line of Hydraulic Fittings



UNIVERSAL LUBRICATING SYSTEMS, INC.

773 ALLEGHENY AVE., OAKMONT, PA.

For more facts circle 607 on Reply Card

NEW PRODUCTS

(Begins on page 134)

high pressure hydraulic cylinder, the piston rod of which operates the movable clamping member. Booster and cylinder are assembled integrally. Brass V jaws on the clamp are provided to prevent marring of the polished rod finish under clamping pressure.

A feature of this clamp is the tightening adapter for piston and follower assembly. This adapter is hinged to swing away from or toward the clamped rod and contains a circular tightening disc that turns by ratchet action of two small-bore hydraulic cylinders operating at the pump pressure. Manufacturer points out that while this clamping device is specially designed for piston rod assemblies, the booster operated clamp itself, because of the pressure developed in such compact space, offers advantages in many clamping jobs. Miller Motor Co.

43—UTILITY WRENCH has de-burring, non-slip features

Designed for easier and faster assembly of thin-wall fittings, a new utility wrench for use with the manufacturer's compression-type couplings and connectors comes in two sizes, each with double ends to handle ½ in. and ¾ in., or 1 in. and 1¼ in. fittings. Made of

drop forged steel, it is smoothly finished for comfortable gripping and balanced for good leverage.

As a de-burring tool, the wrench smooths newly-cut ends on thin-wall conduit inside and out simultaneously. When used as a wrench, the shoulder plate and overlap lip hold the wrench snugly on the nut. Between tightening turns, the wrench is lifted slightly off the nut and turns freely on the rounded edge of the shoulder plate. Appleton Electric Co.

It's easy to obtain product data with the postage-free Reader Service Cards. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

44—REDUCING VALVES for steam, air, gas, liquids

New small flow valves included in this line have a variety of applications in molding plants, pilot plant operation, laboratory units and other fields where small flows are frequently a problem. Compact and rugged, the valves handle inlet pressures to 1000 psi and

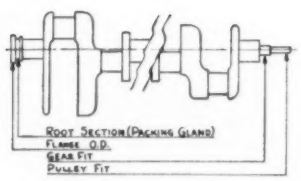
Salvage of rejects speeded by new metallizing alloy

outwears old bearing material 25 times

Automotive manufacturers replace chrome plating installation with metallizing for salvage of mis-machined crankshafts; step up output to 10 per hour

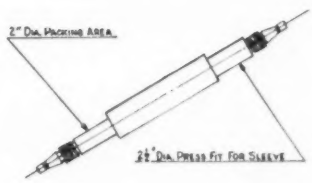
Sprabond Wire, the new self-bonding metallizing alloy, is speeding reject salvage in a wide range of production applications. It has been found particularly valuable in building up parts which have been machined undersize, or damaged by tool marks. Resulting surfaces are extremely hard and, due to their microscopic pore structure, tend to hold considerable amounts of oil. These factors produce excellent wear characteristics, some users reporting increases in service life as much as 25 times that obtained in any other way.

Application is simple and fast; only 3 operations: (1) the part is cleaned or undercut; (2) Sprabond Wire applied; (3) the surface finish-ground. Dovetailing and undercutting often not required and build-up can be carried to a feather edge. No danger of warpage because negligible heat is generated in the part during spraying.



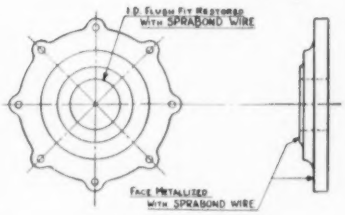
Better and faster than plating

Sketch shows automotive crankshaft of the type being reclaimed in quantity by large manufacturer. These parts were formerly reclaimed by plating, which was slow and expensive. With metallizing, however, production rate is 10 shafts per hour.



Where welding is impractical

Heat warping and consequent straightening costs made welding impractical for salvage of blower shafts such as shown above. Shafts formerly scrapped and replaced are now rebuilt. With Sprabond Wire metallizing, saving is $45.00 each.

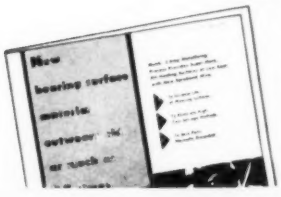


Fits restored—no re-machining

Press fit in electric motor end bell is frequently lost through wear. Welding is impractical here, too, because of warpage. But a few thousandths of Sprabond Wire on the I.D. builds a press fit so that even minimum grinding is often unnecessary. Savings per end bell—about $30.00.

Some other money-saving applications for the Sprabond Wire process

Cracked blocks and castings — flat surfaces — molds, patterns, match plates — sand holes thin sections — lathe ways—inside diameters — gas holes.



FREE Metco Bulletin 57B describes the advantages of the Sprabond Wire metallizing process in detail. Micro-photograph of Sprabond Wire coating on steel shows how it works. Use the coupon to send for your free copy today. No obligation, of course.

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO®, SPRABOND WIRE. ®Reg. U. S. Pat. Off.

Don G. Watson
Metallizing Engineering Co., Inc.
38-14 30th St., Long Island City 1, New York

Please send me Bulletin 57B.

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METALLIZING ENGINEERING CO., INC.
38-14 30th STREET METCO LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England

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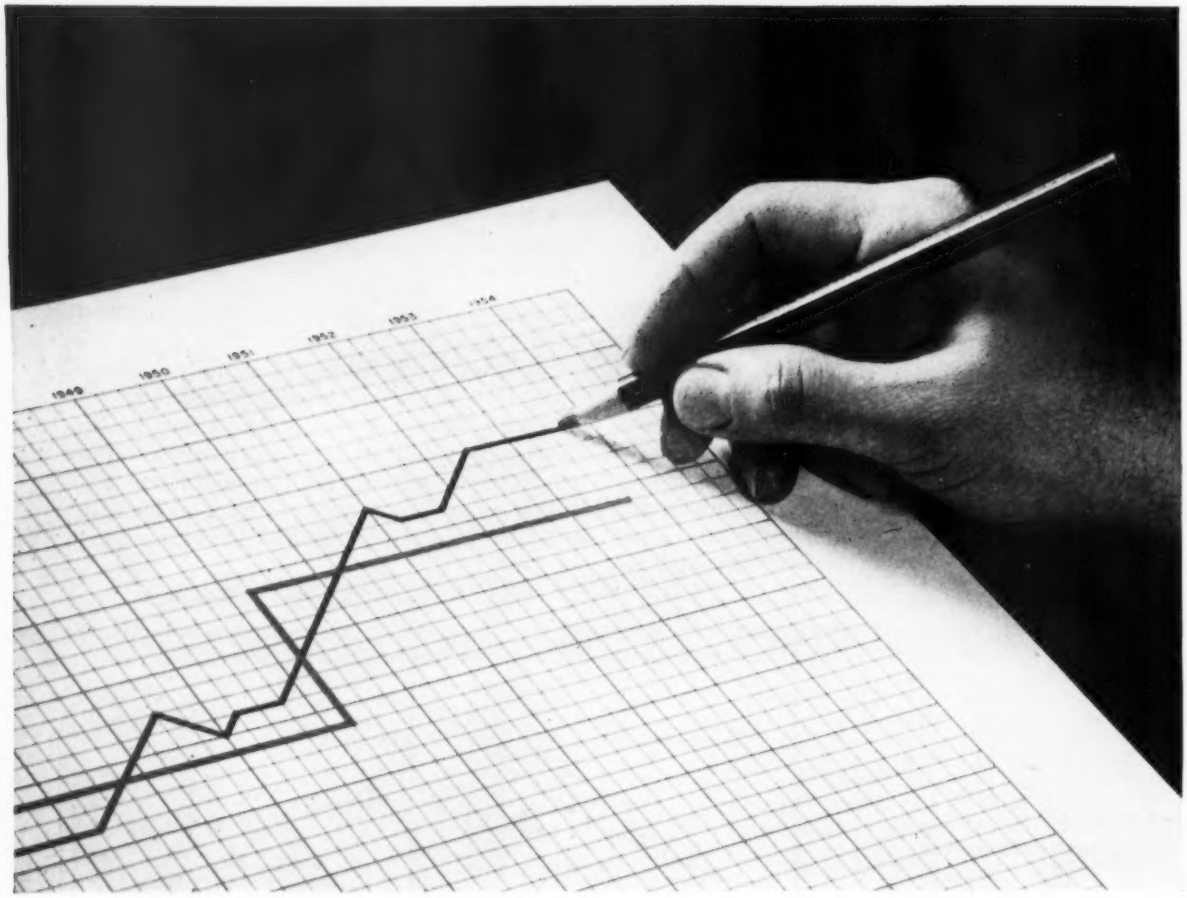

Caution: dangerous curves

Keeping your fire protection properly balanced with changes in processes as well as ups and downs in production is vital to efficient, profitable operation.

You'll find your best answer to this serious fire problem which is currently confronting industry by installing an expansible, fully approved C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Changes in your fire protection requirements are easily and economically provided for with a C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System by initially installing an oversized storage tank and adding where necessary the supplementary discharge facilities at a later date.

Flexibility is the keynote . . . the low pressure carbon dioxide storage tanks range in capacity from one to fifty tons . . . discharge facilities can be either manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs.

WHEN BUSINESS STOPS . . . INCOME STOPS!

Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today... our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
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AFFILIATED WITH PYRENE MANUFACTURING COMPANY

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NEW PRODUCTS

(Begins on page 134)

reduced pressures from 2 to 400 psi. Capacity data on the valves is given in Bulletin 511-A. Leslie Co.

45—CARBON BRUSH is designed for better contact

A neoprene pad holds together multiple brush units of a newly announced carbon brush design. This is said to afford better contact, reduced vibration and reduced circulating current. The design

also allows greater brush flexibility to eliminate uneven brush wear and to improve brush life.

Multiflex Brushes are tailor-made and need not be cut to fit commutator. Helwig Carbon Products Co.

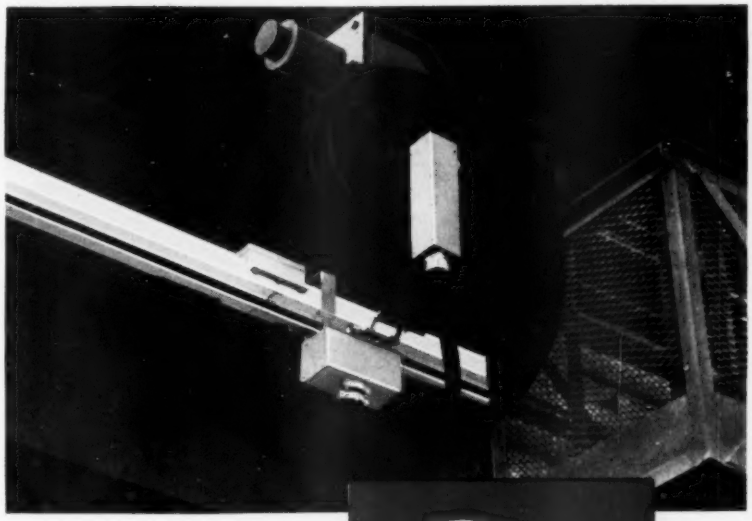
46—BULLET-PROOF APRONS to protect machinists

Reported tough enough to stop a 0.38 calibre bullet fired from a distance of 8 ft, these aprons were developed for use at Lockheed Aircraft Corp. to protect machinists from flying metal particles that may spurt from high-speed milling and cutting equipment. The shield-like aprons are made of glass cloth laminated with a polyester resin, and weigh less than 3 lb. They're manufactured under license from Lockheed and commercially available from manufacturer. B. F. McDonald Co.

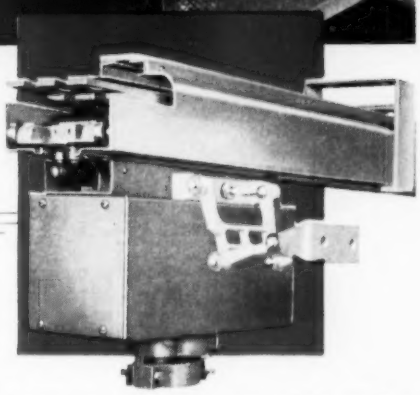
47—STAINLESS STEEL PUMP for foods and chemicals

Stainless steel pumps in the new "S" series incorporate features of company's standard self-priming design. Since the only parts in contact with the fluid are the stainless steel body block and corrosion-resistant molded, flexible liner, these pumps are said to be particularly adaptable for extreme corrosive service, or for handling foods or other

safe electrification for HEAVY DUTY CRANES and HOISTS



FEEDRAIL® Moving POWER SYSTEMS



Why let Crane and Hoist wiring endanger workers or be a potential hazard to your plant? The new Heavy Duty Feedrail trolley busways give you the *safe* way because:

1. **They're a built-for-the-purpose system, designed and constructed *expressly* for high amperages.**
2. **All current carrying conductors and trolley contacts are protected every inch of the way.**

In addition to giving you maximum safety, Heavy Duty Feedrail will readily fit your specific application requirements. Its standardized components—accurately, ruggedly constructed—make for fast, easy installation. And, you'll find that its low maintenance, long life and continuous dependable service are economy factors in plant operation. Send for Heavy Duty Feedrail descriptive bulletin. Write Dept. P-9

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc

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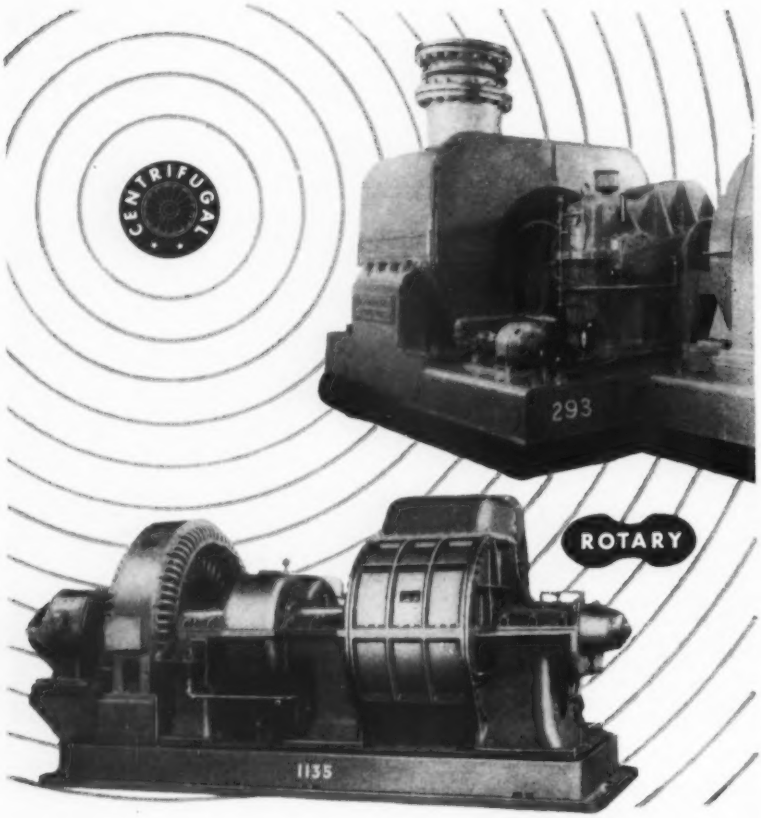

ONLY THE BLOWER *Specialists* BUILD THE DUAL-ABILITY LINE

To meet the varying problems of handling air or gas, in industrial processes, Roots-Connersville builds two complete lines of blowers and exhausters—Rotary Positive and Centrifugal. Together, they cover capacity requirements from 5 cfm to 100,000 cfm in single units. Centrifugals are available in multi-stage units, as illustrated, or in single-stage types.

Thus, this exclusive *dual-ability line* permits selection (without prejudice as to types) to meet the needs of most moderate pressure applications. Regardless of their sizes or types, R-C Blowers are unmatched in reliability, operating economy and long-time performance. Built into them is almost a century of specialized experience in handling gas and air, which is our exclusive business.

In addition to blowers and exhausters, R-C products include a wide range of gas and vacuum pumps, meters, inert gas generators and other related equipment. So, whenever you have a need for moving or measuring gas or air, we suggest consultation with the R-C Specialists.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC. 539 Planton Ave. • Connersville, Indiana

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NEW PRODUCTS

(Begins on page 134)

liquids or slurries which must not become contaminated.

The flexible liner may be furnished in a wide choice of materials, including gum rubber, natural rubber, Neoprene, and others, to permit selection of best material for a particular application. The pumps are available in capacities from 1/3 to 20 gpm, for discharge pressures to 60 psig with suction lifts to 26 in. Hg. Vanton Pump Corp.

48—WINCH ARRANGEMENT to make die handling easier

This winch and cable arrangement can be mounted on any of manufacturer's sheet feeding tables to make the table do double duty—keep stock elevated at the correct height or act as a die changing device between production runs. A 96-to-1 gear reduction permits manual operation for drawing dies weighing up to 5 tons. Two reels, each holding 15 ft of cable, are mounted at the ends of the table and connected by a shaft.

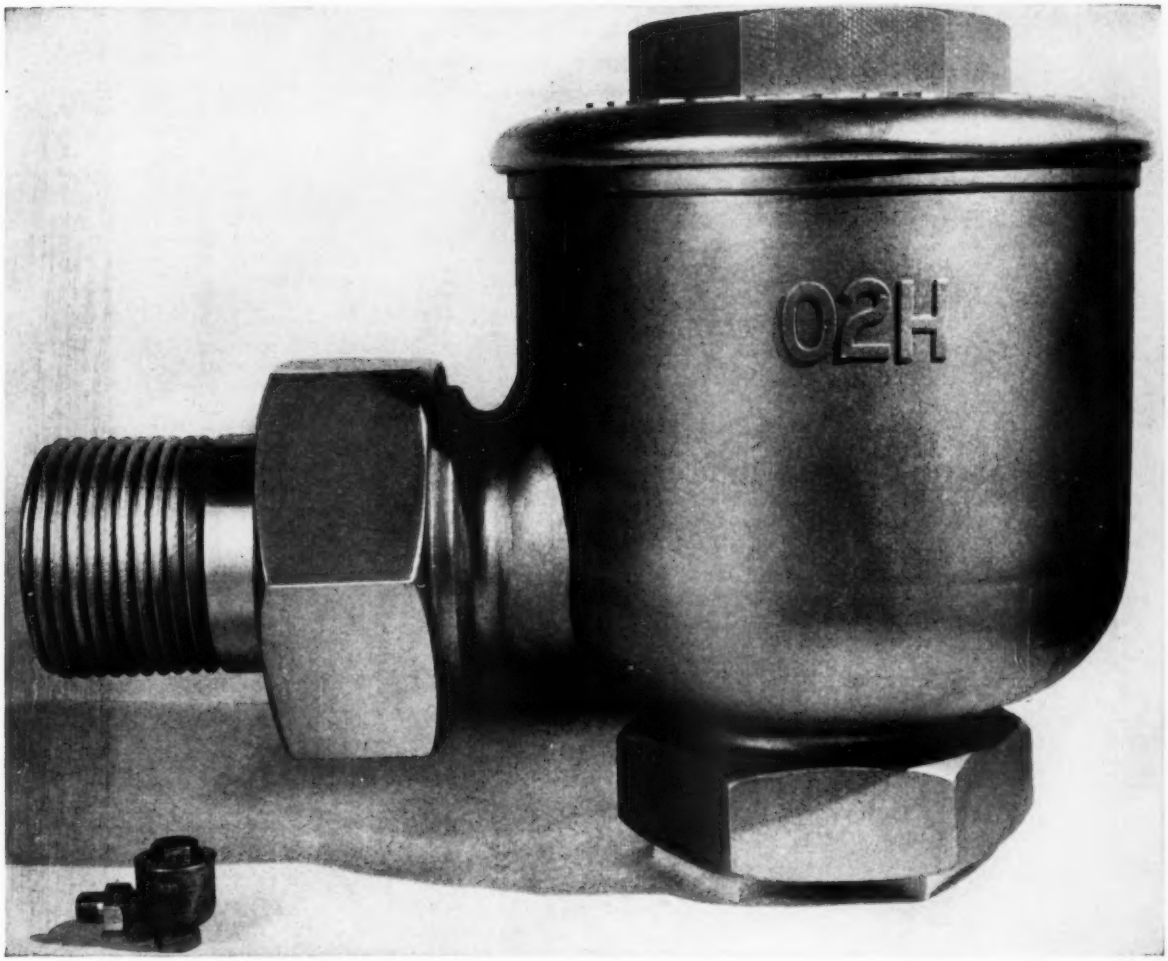
Dies can be drawn from a press or placed in the press by the two-way operation of this winch. A straight pull is made when removing dies, or the cable can be run around pulleys when transferring the die from the table to the press. Full working surface of the table is maintained for sheet feeding because the winch is mounted on brackets which extend beyond the sides of the table top. The Raymond Corp.

49—FHP MAGNETIC BRAKES for a-c or d-c motors

These fractional horsepower magnetic brakes are available with torque ratings of 1½, 3 and 5 ft-lb. The brakes self-adjust for wear, but critical adjustment of torque can be made for precisely-timed stops. The units have thermal ratings of 6, 7 and 8 hp seconds per minute. Molded asbestos friction discs with high heat dissipation are provided to keep operation cool. All of the brakes are equipped with hand release, and mount without dismantling.

Motor and brakes are connected in parallel. When the motor starts, the energized magnet operates to release pressure on rotating friction discs. Stopping the motor de-energizes the magnet, freeing the pressure plate, which applies pressure to friction discs. The brake mechanism is housed in cast aluminum cover with cast iron mounting bracket. A bulletin gives detailed data. Dings Brakes, Inc.

To receive product data circle item numbers on the handy Reader Service Cards on pages 39-40 and 191-192.



. . . a small Trap — but BIG in performance

If you need complete data on Webster Steam Heating and Process Steam Specialties, get this binder of bulletins. Write for your copy today. Ask for Bulletin C-536.

It works all the time... automatically . . . discharging air and water of condensation . . . holding steam in radiators or steam-using equipment until it has given up its useful heat. It's a servant that never sleeps. It's your Webster Radiator Trap.

You can hold it in the palm of your hand. It's comparatively small in size, but big in performance. Shown at lower left above is an actual Webster Trap. Shown next to it is a giant model of this same trap . . . illustrating how the savings from one Webster Trap multiplied 100, 500 or 1,000 times play a vitally important role in fuel conservation.

Webster Traps, like all Webster steam heating specialties, give years of trouble-free service. Materials are selected for ability to withstand severe service. Parts are inspected after each manufacturing operation. No item leaves the factory until it has proved that it will function properly.

See your Webster Representative for complete data on Webster Radiator Traps, Radiator Valves, Float and Thermostatic Traps, Dirt Strainers . . . for low pressure vapor and vacuum steam heating service.

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In Canada, Darling Brothers, Limited, Montreal

Webster HEATING

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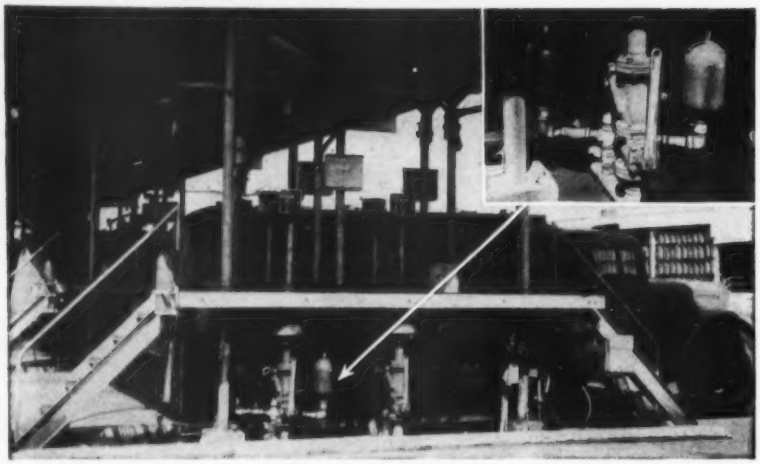
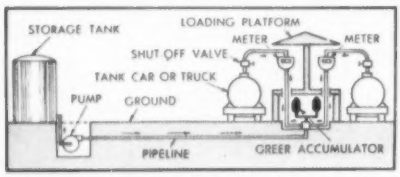
GREER TOPICS

Functions and Applications of the Greer Accumulator

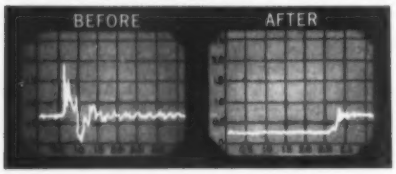


To reduce line shock effectively only two Greer Accumulators were necessary to handle this series of loading racks for petroleum bulk station. Inset: closeup of installation.

How Greer Accumulators Suppress Line Shock



Above: a schematic of bulk station operation. Below: hydrauliscope gives conclusive evidence that line shock was reduced more than 100% when three valves were closed at once. Write for hydraulic line shock Bulletin 600.



Pressure surges from rapid opening and closing of valves effectively reduced

In loading tank cars or trucks from petroleum bulk stations as an example (see schematic diagram on left), the amount of fuel pumped into a tank must be carefully measured by flowmeters.

By just opening and closing the shut-off valve, line shocks develop with great intensity to cause repetitive flowmeter failures that result in erroneous readings. This can be costly to the operator selling this fuel at a given price.

By installing Greer accumulators that function as perfect shock absorbers, these dangerous pressure surges are made harmless (see hydrauliscope test on left). The elimination of costly flowmeter and pipeline maintenance more than paid for the accumulators within a year.

If your problem is hydraulic line shock, a Greer accumulator is the answer. Let our engineers help you. Call or write today. No obligation.

Greer accumulators have many uses as:

(1) Pressure storage chamber for main, auxiliary and emergency power (2) Pressure-volume compensator for leakage and temperature (3) Dispenser of fluids and lubricants (4) Transfer-barrier for fluids and gases (5) Shock absorber for line shock and pump pulsation.

Precision engineered to make any hydraulic system better! Complete data and diagrams in Brochure 301. Write for your free copy.

GREER ACCUMULATORS

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Greer Hydraulics Inc. 454 Eighteenth Street, Brooklyn 15, New York

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For more facts circle 613 on Reply Card

Plant Engineer's Role

(Continued from page 116)

scene. Nothing is more disturbing to the line supervisor than to be ill-informed, or to hear of plans or changes from a worker before hearing it from the management he represents. It is vital that you coordinate the planning and the action all the way down the line, and be sure that your subordinates have a full explanation of not only what is going to happen, but why it is necessary.

Summarized in concise form then, these basic principles upon which to start your program may be stated as follows:

1. Issue instructions, ask questions, and receive complaints in a courteous, intelligent, and friendly manner.
2. Be completely informed before acting. Explain fully, and follow up.
3. Award fair and equitable treatment to every employee.
4. Coordinate planning and action all the way down the line.

You can quickly recognize that none of these measures requires a major overhaul of your operating methods, nor a compromise with the principles of firmness or decisiveness. Also, there is no additional burden to your present heavy workload. Yet, minor as they may seem, the unqualified practice of these precepts will make a vital and significant contribution to your labor relations program.

I feel it only proper to point out to you that experience has shown that the employee relations problems connected with maintenance and mechanical personnel are often more complex than problems of other workers. Perhaps there are many factors which help produce this situation. I wish to call your attention to a few, so that they may receive careful thought and consideration.

First, we recognize that the plant engineer, through his foremen, has control of the personnel who are normally in the higher skilled classifications. As these workers have progressed into these skilled jobs, it is only natural that they should become more aware of their value to the company and the importance of the job they perform. Sometimes there is a possibility that such a worker will exaggerate to himself the relative importance of his job as compared with a production line worker, and feel he should accordingly be awarded extreme preferential considerations.

The very nature of the maintenance and mechanical work may be somewhat unstabilizing to employee attitude. In many cases, maintenance personnel work under continual pressure, as in cases of breakdowns or repairs which are hindering production. Often they may con-

longer die life,

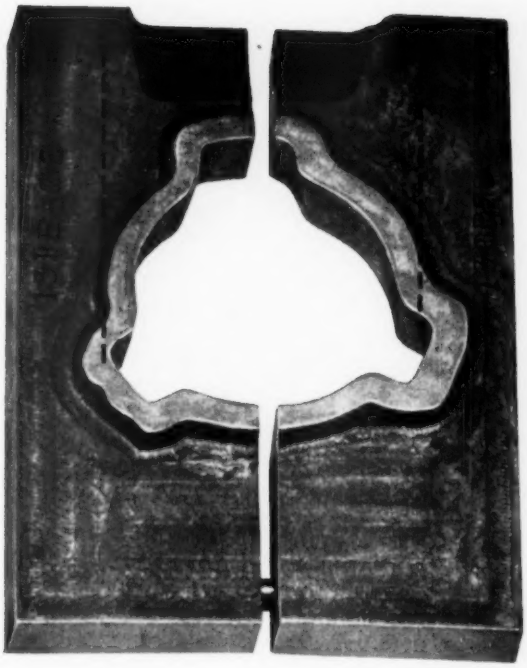
increased production,

lower costs, with

REXWELD

hard surfacing

welding rods



Consolidated Industries, Inc., West Cheshire, Connecticut, greatly increased die life and lowered production costs by hardfacing hot trim dies with Crucible REXWELD.

Rexwelded dies give higher edge strength at elevated temperatures, resist chipping and deformation, and keep clean, sharp cutting edges . . . all of which means longer, more efficient service from an expensive die.

Rexwelding reduces rejects to a minimum, too. This is particularly important when working alloy steel or critical material such as the highly stressed aircraft housing bearings shown above. These were produced from Rem-Cru RC 70 Titanium to close tolerances.

Use REXWELD for *all* your hard surfacing jobs. Surfaces can be Rexwelded many times — greatly increasing the service life of the part. REXWELD Hard Surfacing Rods are available in both bare rods and low hydrogen coated electrodes, in a wide selection of grades and sizes to fit your specific application.

Aircraft housing bearing forged of Rem-Cru RC 70 titanium. (A) Trim die; (B) Forging.

CRUCIBLE first name in special purpose steel

53 *years of* Fine *steelmaking*

REXWELD HARD SURFACING ROD

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL MACHINERY • SPECIAL PURPOSE STEELS

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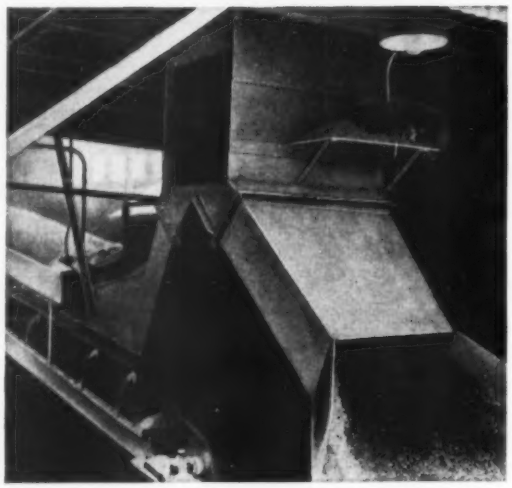
PITTSBURGH COKE & CHEMICAL Reports:

ERIEZ DRUM PULLS IRON FROM SLAG AND IT'S WORTH $40 A TON TO US!

ERIEZ Permanent Magnetic Drum removes 3 tons of iron daily!

"It's like finding gold . . ." says L. R. Forbrich, Cement Plant Superintendent of the Pittsburgh Coke & Chemical Company. Installed on a granulated slag drier, an Eriez Permanent Magnetic Drum has been working 24 hours a day . . . separating an average of 3 tons of scrap metal profits each week from granulated slag! The slag is used in the manufacture of the company's Green Bag Portland-Pozzolan Cement. "The Eriez Drum not only maintains our product's quality, but it reclaims valuable metal. This metal, as scrap iron, is worth about $40 a ton to us on today's market. The drum has paid for itself many times over."



Installed at the discharge of an open or closed chute, spout or screw conveyor, etc., the Eriez Magnetic Drum and Housing automatically, simply and economically removes tramp iron from chemicals.

Only the ERIEZ line of Drums has All These Features:

1. Stainless steel shell resists corrosion and abrasion.
2. Dust-tight construction standard at no extra cost.
3. Rigid, lightweight, compact, cast aluminum sides.
4. Sheave size easily changed for various operating speeds.

Write for new, FREE 6-page Drum Bulletin which describes all separator installations for the chemical industry.

ERIEZ MANUFACTURING COMPANY

15 Magnet Drive • Erie, Pennsylvania

"Buy permanent protection . . . by ERIEZ"

For more facts circle 615 on Reply Card

tinue working beyond their normal quitting time, or may be called back from their homes in emergency situations. Such overtime work may not only create individual problems for the worker, but it is frequently accompanied by the task falling to management of assuring equal distribution of overtime among all of the qualified employees.

In industrial-type unions, the higher skilled workers are often the forgotten men—for, as would be expected, the greatest effort is concentrated where the greatest number of people are located, and that is normally in the unskilled and semi-skilled categories. This factor alone is partially responsible for the move sometimes made by skilled workers away from industrial affiliation and into craft-type unions, which brings to you additional problems of jurisdiction and supervision.

Keep Your Copy Intact

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue.—Editors

And finally, there is often a marked difference in the type of first line management in a maintenance or mechanical department as compared to production departments. By and large, many of the former came up "through the ranks," which included usually an extended period of apprenticeship, plus many years of experience as a journeyman. Even though production foremen may, perhaps, arrive in their supervisory jobs in the same manner, their job experience level is usually not as lengthy, nor as comprehensive. As a result, you may find your key men to be more exacting in their demands, less tolerant, and usually less diplomatic in their employee relationships. And since these first line foremen play such a key role in any successful program, you should give careful attention to directing their sights toward a proper labor relations goal.

You no doubt realize that devices to give a true measurement of employee attitude and industrial harmony are yet to be developed. Those studying employee relations may be using a yardstick where micrometers are needed, if indeed, even a true yardstick exists. Perhaps management has failed to utilize fully the technical skills of our engineers to help develop a formula to determine the state of employee relations. Un-

Any way you look at it this Thermometer is *Easy Reading*

You've been asking for a dial thermometer like this—A thermometer that can be positioned and firmly locked at any practical angle—now you can have it!

No stretching or straining to see this thermometer. Easy to adjust to required new positions before or after installation. No risk of the multi-angle selector working loose. A specially designed selector assures positive locking at every practical mounting angle and a few turns of *one* nut lock the selector securely.

These instruments, supplementing USG's complete line of Gotham temperature indicators, are designed to fit all standard connections and are available in all standard ranges. If you have a number of applications requiring "odd angle" mounting these new multi-angle thermometers will reduce the number and variety of instruments you have to carry in stock.

Before you order an angle thermometer be sure you see USG's new Gotham Multi-Angle Thermometer.

UNITED STATES GAUGE

ADVANTAGES

1. Positive locking in every conceivable angle.
2. Reduces the number and variety of instruments required in your maintenance stock.
3. Provides that extra "odd angle" instrument which normal stock does not furnish.
4. Easy to change to any desired angle, before or after installation.
5. Saves engineers time when writing specifications.
6. Affords easy reading at odd angles.

United States Gauge
Division of American Machine and Metals, Inc.
Sellersville, Zone 5, Pa.

Gentlemen:
We'd like to know more about the new USG Multi-angle Thermometer. Please get in touch with us.

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THEY HEAT AND HUMIDIFY

THEY COOL AND DEHUMIDIFY

. . . . year-'round comfort at low cost

Clarage Multitherm Conditioning Units are double duty machines. They keep your place cool and dehumidified in summer. They heat and humidify in the wintertime.

You save considerable in cost by having the same equipment working for you the year-'round . . . and every day you're assured of comfortable working conditions.

Multitherm Units come in vertical and horizontal types as shown—ten sizes—capacities 600 to 20,500 c.f.m.

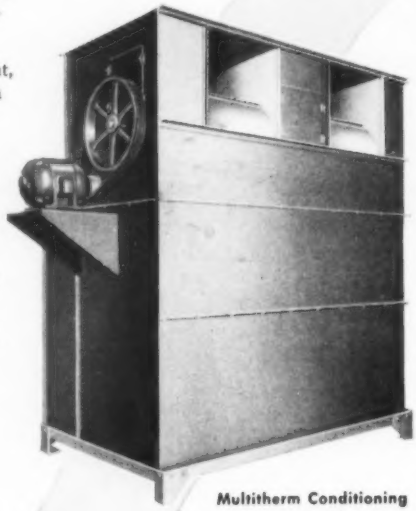
You use a direct expansion refrigerant, cold water or brine for cooling; steam or hot water for heating.

. . . . or process conditioning

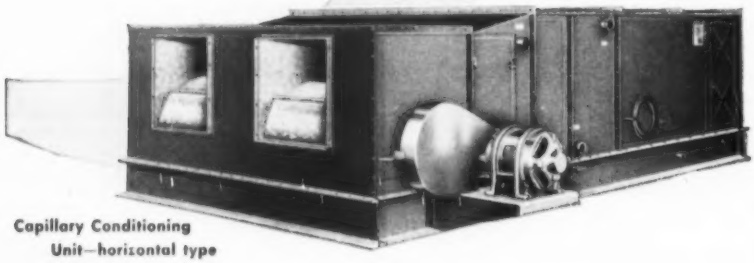
Aside from comfort applications in offices, plants, stores, etc., Multitherm Units are widely used in industry where production depends upon a certain temperature and humidity...and Clarage Capillary Conditioners are available where extremely close control is needed.

We welcome your inquiry for any desired information.

CLARAGE FAN COMPANY
Kalamazoo, Mich.



Multitherm Conditioning Unit—vertical type



Capillary Conditioning Unit—horizontal type

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doubtedly there is a challenging job for you within your own department.

From your experience, you will recognize the fact that you don't wait until it rains to patch a hole in the roof, nor do you wait until a bearing squeaks before greasing it. You know from experience that preventive maintenance can save you time, money, and trouble. I would urge that you likewise apply "preventive thinking" to your employee relations. Many problems can be eliminated before they start, and it would certainly be folly to wait until you have an untenable situation before deciding to act.

As an engineer, you should be unusually adept in promoting a good labor relations program. Both through teaching and experience you have acquired an excellent process of "organized thinking"—the ability to arrange your thoughts in an orderly manner. Further, you are called upon daily to exercise careful analysis and sound reasoning in solving your technical problems. And finally, you have a well-rounded knowledge of all of the allied functions in industry, and thus recognize the necessity of good organization, thorough planning, and proper execution.

With this background, you are certainly capable of helping to lead your team and your department into a sound employee relations program which will return dividends to your organization again and again.

Care of Tools — Scrapers

(Continued from page 121)

able if preferred for use in the tool.

In selecting scrapers, choose them to suit the work they are to do. Bearing and flat scrapers, which are employed in precision work, should be made of good grade tool steel, carefully heat treated, shaped and ground. The handles should be securely attached and comfortable.

Gasket scrapers and solid type carbon scrapers should also be made of tool steel, properly heat treated and ground. Where handles are used, see that they are well secured, sturdy and comfortable.

Putty knives and wall scrapers should be chosen in blade widths and grades suitable for the type of work to be done. Usually the stiff type blade is preferable for scraping, but the half elastic or elastic blades may be preferable for other than flat surfaces. It is important that the handles be sturdy and well attached, to prevent loosening under the hard service to which such scrapers are subjected.

All purpose flexible type scrapers and flexible carbon scrapers should be made of well tempered spring steel blades, securely attached to substantial and comfortable handles.

A good combination brush and scraper should be comfortable to use, have a well secured scraper

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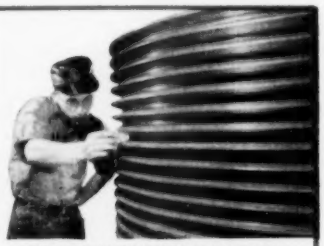
from one reliable source!

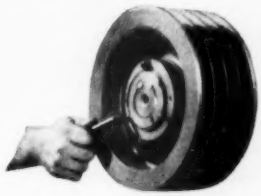
ALLIS-CHALMERS HAS BOTH the engineering experience and the drive equipment to lick the most unusual problems. Your special problems are carefully analyzed by a staff of experienced application engineers familiar with your industry. The result — the right drive for the job! Call your nearby Allis-Chalmers distributor or district office for help on your drive problems, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4087

Texrope and *Magic-Grip* are Allis-Chalmers trademarks.

***TEXROPE* Grommet V-Belts**—20 to 50% longer life than ordinary belts. Size for size, grommet belts give 1/3 more gripping power, pull heavier loads with higher safety factor.



STANDARD CAST IRON SHEAVES — Made to order from stock patterns. One to 14 grooves for A, B, C, D or E belts. One to 1000 horsepower. Split sheave or split hub.



***MAGIC-GRIP* SHEAVES** — Semi-steel casting with interchangeable, patented taper bushings. On and off in a jiffy. Cannot shake loose. Two to 12 grooves for B, C and D belts; 2 to 250 hp.

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Applied . . .

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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

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...it's Bronze-to-Bronze Seating in a True Ball Joint!

The drop-tight fit of a Dart is directly traceable to the precision grinding of its two bronze seats which form a true ball joint. No need to strain with a wrench — fastening and uncoupling are equally easy. Because the seats stay "healthy" Darts can be used over and over again — *to cut costs!* See your supplier today.

QUICK FACTS

- Dart's heavy shoulders can withstand any amount and degree of wrenching
- Dart's extra-wide bronze seats resist pitting and corrosion
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DART
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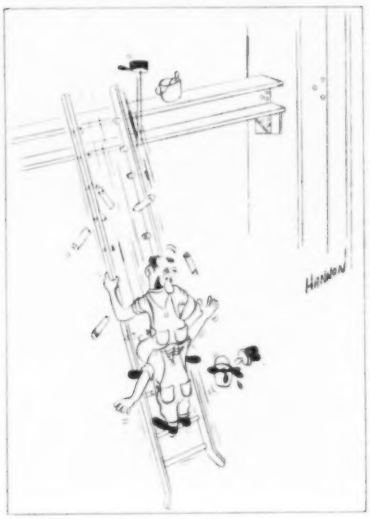
blade, and the brush section should be rigid.

In using bearing and flat scrapers, Prussian Blue is employed to locate the high spots, in conjunction with the shaft or spindle for bearings, or a surface plate in the case of flat surfaces. The high spots are then removed by scraping. The direction of scraping should be changed each time the results are checked. Scrape relatively hard until the surface is covered with large, closely spaced spots. Then scrape only the blue spots and finish by scraping only the blue spots having shiny centers. Scrapers should leave the surface perfectly smooth and scratch-free.

When employing other types of scrapers, avoid unnecessary pressure



and sharp bending of the scraper, and always have the tool under steady control, to prevent injury to the hands in the event it unexpectedly slips over the work surface. Always wear goggles when scraping.

Bearing, flat, gasket and solid type carbon scrapers and beveled edge putty knives and wall scrapers should be kept keen-edged on an oil stone. Usually grinding is required after a number of stonings. Take care to avoid changing the cutting edge shape or overheating it and drawing the temper.

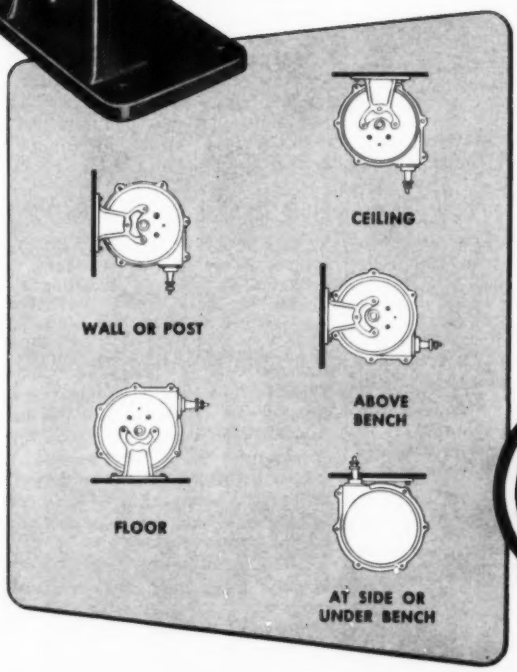
The scraper on the combination brush and scraper need only be sharpened by grinding. Square edged putty knives and wall scrapers may be sharpened by grinding and stoning.

The all-purpose flexible scraper can be resharpened on a fine grit grinding wheel by placing a plug inside the wires and a rubber band around the outside. Flexible carbon scrapers may also be sharpened on a similar grinding wheel.

All knife edge scrapers should have their cutting edges protected when not in use, and all scrapers should be wiped with an oily cloth after use to prevent rusting.

STOP WASTE MOTION... LOST MAN HOURS *with*

WAYNE PRODUCTION BOOSTER HOSE REELS



Get more production per worker with Wayne Retriever Hose Reels . . . engineered to reduce wasted motion. Easily installed . . . easily reached—overhead, underbench, floor or beside bench—Wayne Hose Reels have proved themselves "production-boosters" in all types of plants from coast to coast.

Wayne Hose Reels work like a window shade. Rachet holds hose at any desired length. Slight pull on hose releases catch and hose rolls back automatically to pre-determined setting . . . rubber bumper stops it. Ruggedly built for hard continuous use.

Cut worker fatigue . . . increase productive time . . . reduce tool maintenance costs . . . install Wayne "Production-Booster" Hose Reels on your production and assembly lines. There's a Wayne Reel to meet every requirement whether for air, oil or water. Write for new folder on hose reels.

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FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS

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The St. Charles Manufacturing Co., St. Charles, Ill.

1. Hanging cabinets and fixtures for cleaning before painting.

2. Cabinets and fixtures leaving the prime ovens.

3. A complete custom-built St. Charles Kitchen.

Straight-Line Production Methods

MANUFACTURE

Custom-Built Kitchens

IN ST. CHARLES, ILLINOIS

When St. Charles Manufacturing Co. outgrew its original facilities, it determined to apply the economies of straight-line production to the manufacture of custom-built kitchens. Each of these kitchens, available in eleven different colors, is individually built for a specific home.

With St. Charles production personnel, Knight Engineers made a study of production scheduling, facilities requirements, and methods of operation and handling in order to apply the most efficient straight-line production methods.

As a result of the combined experience of the St. Charles organization and Knight Engineers, a plant layout was established to permit increased production per man-hour, improved working conditions, elimination of heavy handling and rehandling, reduction in man-minutes per operation, automatic metal cleaning, and automatically controlled continuous baking ovens. All these factors combine to assure high quality for St. Charles kitchens, one of the luxury housing items available at low cost.

With the plant layout established, Knight associated architects designed the plant "envelope" to house manufacturing facilities, comfortable, efficient offices, personnel facilities and cafeteria. Knight Engineers also furnished Construction Management to supervise completion of the plant and to insure lowest construction cost.

A comprehensive service for a complete plant to produce a high-quality, low-cost product is available from the Knight organization. For prompt attention, call our Chicago or New York office.

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NEW BOOKS

for the plant engineer

Survey of Air Pollution

ATMOSPHERIC POLLUTION by A. R. Meetham, D Sc. Size 6¼ by 4 in.; 264 pp; cloth bound. Published by Pergamon Press Ltd., 2, 3 and 5 Studio Place. Kinnerton St., London, S.W. 1, England. Price $4.90.

DR. MEETHAM has packed a remarkable amount of information into his survey of atmospheric pollution, from the execution of the unfortunate artificer who violated a smoke abatement law in 1306 to the preventive measures we are taking in our less barbarous, but smokier, times.

Though the atmosphere can be polluted in many ways, fuel is by far the worst offender, so most of the book is devoted to atmospheric pollution caused by the combustion of coal, oil, and other fuels.

The author describes the origins and characteristics of various natural and artificial fuels; construction and operation of such maior polluters as boilers, furnaces, kilns, etc.; how atmospheric pollution is measured: its effects, distribution, cycles, and ways it can be limited or prevented. He concludes with a description of the anti-smoke laws in Britain and the United States.

For the American reader the book has the disadvantage of referring to British rather than U.S. practice; but as the pollution problems of both countries are practically identical, this detracts little from its value.

Fluid Mechanics

BASIC MECHANICS OF FLUIDS by Hunter Rouse and J. W. Howe. Size 9 by 5¾ in.; 245 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $4.50.

ALTHOUGH a relatively simple presentation of this subject was considered an impossibility by many, the authors went ahead and developed one. Their work had been originally intended for undergraduate study and requires a working understanding of college calculus to be fully appreciated

The organization of the material is such that there is a relationship between statements and principles. Otherwise, it could be a compilation of groups of unrelated thoughts. The book offers information that is practical besides being of academic value. There are about 400 problems which present an opportunity to apply principles learned in the book.

Buoyancy and flotation, principle of energy, non-uniform motion of confined fluids, uniform flow in

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Fig. 2608—200-pound Bronze Globe Throttling Valve that permits full flow through the seat when wide open.

To be completely satisfactory, a valve must function perfectly, give maximum length of service and require minimum maintenance. To do this it has to be exactly right—in design and materials—for all the conditions under which it must operate.

And because Powell makes just such a valve for every service in modern industry, Powell Valves give complete satisfaction.

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Fig. 1793—Large 125-pound Iron Body Bronze Mounted Gate Valve with tapered solid wedge. Made in sizes 2" to 30", incl.

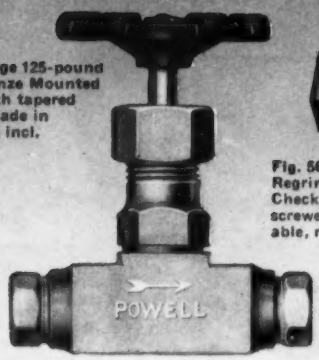
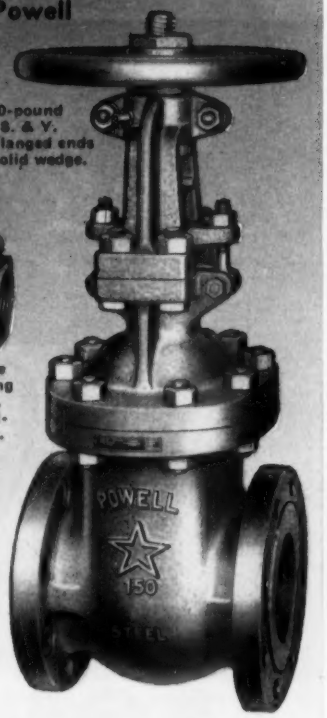


Fig. 1976-K — Powell Stainless Steel Koncentrik fitted Needle Globe Valve for 3000 pounds W.O.G. Especially adapted for instrument lines. Simplifies tubing installations and provides positive leak-proof connections without threading, welding or soldering. Gate, Globe, Check and "Y" Valves also available. Made in sizes for tubing up to and including 1" O.D. Also made in other corrosion-resisting metals and alloys. WRITE FOR ILLUSTRATED CIRCULAR.

Fig. 560—200-pound Bronze Regrinding Horizontal Swing Check Valve. Screwed ends, screwed-on cap and regrindable, renewable bronze disc.

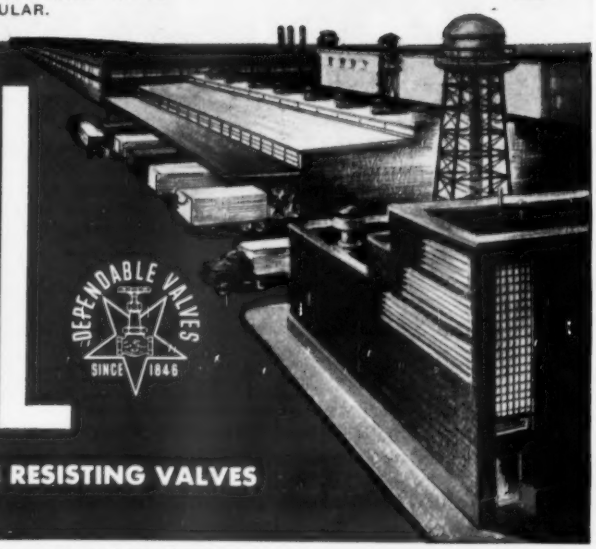
Fig. 1503—150-pound Cast Steel O. S. & Y. Gate Valve. Flanged ends and tapered solid wedge.



POWELL

DEPENDABLE VALVES SINCE 1846

BRONZE, IRON, STEEL AND CORROSION RESISTING VALVES



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pipes, surface resistance, turbo-machinery, and significance of the Mach number are some of the topics that appear in this book.

Construction

STABILIZING CONSTRUCTION by Miles L. Colean and Robinson Newcomb. Size 9¼ by 6¼ in.; 340 pp including index; 1952 edition; cloth bound. Published by the Committee for Economic Development, 444 Madison Ave., New York 22, N.Y. Price $6.00.

MANY FACETS of the construction industry, with causes and effects of construction stability and instability are offered in this book. Government, management and labor restrictions on construction activity are given attention. The book also covers the changing demand for different types of construction and the influence of economy on construction.

Here are some of the topics that the book includes: The complexity of construction; trends in construction cost, 1913-1950; methods of initiating construction; the complex system of materials distribution; efforts to combat restrictions; government regulation and stimulation of credit; and potential influence of private contracyclical planning.

The appendix section contains many pages and offers materials on building cycles, characteristics of contractors, construction employment as well as much useful data in tabulated form.

Factors in Plant Location

PLANT LOCATION by Leonard C. Yaseen. Size 11 by 8½ in.; 195 pp; illustrated; flexible cover. Published by Business Reports, Incorporated. 225 West 34th Street, New York 1, N.Y Price $12.50.

OUT OF MANY years of experience in work on plant location comes this comprehensive book on the subject. It brings to light many factors that are involved in plant site selection and makes one realize that the job of selecting a spot on which to build a plant is not a matter of considering a few items. It is an important undertaking demanding intelligent study of many factors which eventually are to form the pattern of decison.

In this book, the author covers such subjects as transportation, power supply, fuel supply, climate, labor laws, labor and taxes.

The book contains tables, maps and graphs to show among other items: weather conditions of various American cities; minerals and mineral production by states; work stoppages in 1951, by states; and average increase of manufacturing employment from '39 to '50 by states.

Research

REVIEW OF CURRENT RESEARCH and Directory of Member Institutions. Size 9 by 6 in.; 330 pp including index; paper bound. Published by the Engineering College Research Council, The Pennsylvania State College, State College, Pennsylvania. Price $2.50.

AMERICAN industry reaps many benefits from research activities in many institutions of higher learning. This book gives one an idea what sort of work is being done. It lists many projects now active in various American colleges and institutions. In addition to the lists of research work, the book includes the following information: mail addresses; research officers; policies; personnel; expenditures; and income.

The Industrial Safety Engineer

THE ORGANIZATIONAL POSITION of the Industrial Safety Engineer. Size 7½ by 5½ in.; 30 pp; illustrated; paper bound. Published by the Society for Advancement of Management, 74 Fifth Ave., New York 11, N.Y. Price $1.00.

This is a special committee research report; it is basically presented in the form of a series of graphs which give a good overall picture of the status of the safety engineer in industry. These charts show among other things the salary groups of safety engineers based on experience and education; responsibility and company injury rate; and organizational position and salary.

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When you install Lovejoy Flexible Couplings you get more than just long-lasting smooth power transmission. You get maximum protection against surge, backlash and starting torque. You get reduced down-time and less maintenance, since cushions can be changed without shutdown and Lovejoy Flexible Couplings *never* require lubrication.

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GET THE JOB DONE FASTER – EASIER – AT LOWER COST

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★ **The Most Complete Line of Equipment for BOTH Vertical and Horizontal Handling.**

★ **Originators of the Mercury "TRACKLESS TRAIN" System of Materials Handling.**

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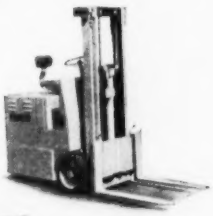
A few of the outstanding quality features of Mercury Fork Trucks include—*simple, single cylinder low* pressure hydraulic lift with patented cross suspension . . . magnetic contactor travel control with foot actuated, timed acceleration and controlled plugging . . . shockless wheel steering by means of compensating, controlled castor type trail axle . . . double reduction unit assembled drive.

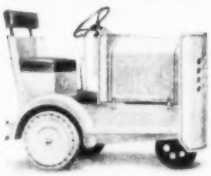
"YAK" FORK TRUCK Model 430
4,000 lbs. capacity



"JEEP" FORK TRUCK
Model 230
2,000 lbs. capacity

"YANK" FORK TRUCK
Model A-1544
6,000 lbs. capacity

TRACTORS AND TRAILERS



"Tug" Electric Tractor: Available in 3 capacities and 3 wheel, twin-3 or 4 wheel types.
"Banty" Gas Tractor: The smallest tractor made, yet develops a draw bar pull in excess of 2,000 lbs.

Also, "Huskie" and "Super-Huskie" gas tractors, 4 and 6 wheel heavy-duty models.
Trailer: Available in castor, 5th wheel or 4 wheel steer, platform or side dump types.

The Mercury "Huskie" tractor hauling a train of loaded Mercury type A-310 trailers in a large electrical manufacturing plant.

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Illustrated right is "Shuttle-Truk" 3-wheel burden carrier, 2,000 lbs. capacity. Illus. left is "Standard" high lift truck, 6,000 lbs. capacity.

Complete line includes narrow or wide models rated at 3,600, 4,000, 6,000 and 10,000 lbs. capacity with low, high or telescopic lift.

The Mercury Model A-1006 narrow type 4,000 lbs. capacity high lift truck stacking skids of corrugated paper in a carton manufacturing plant.

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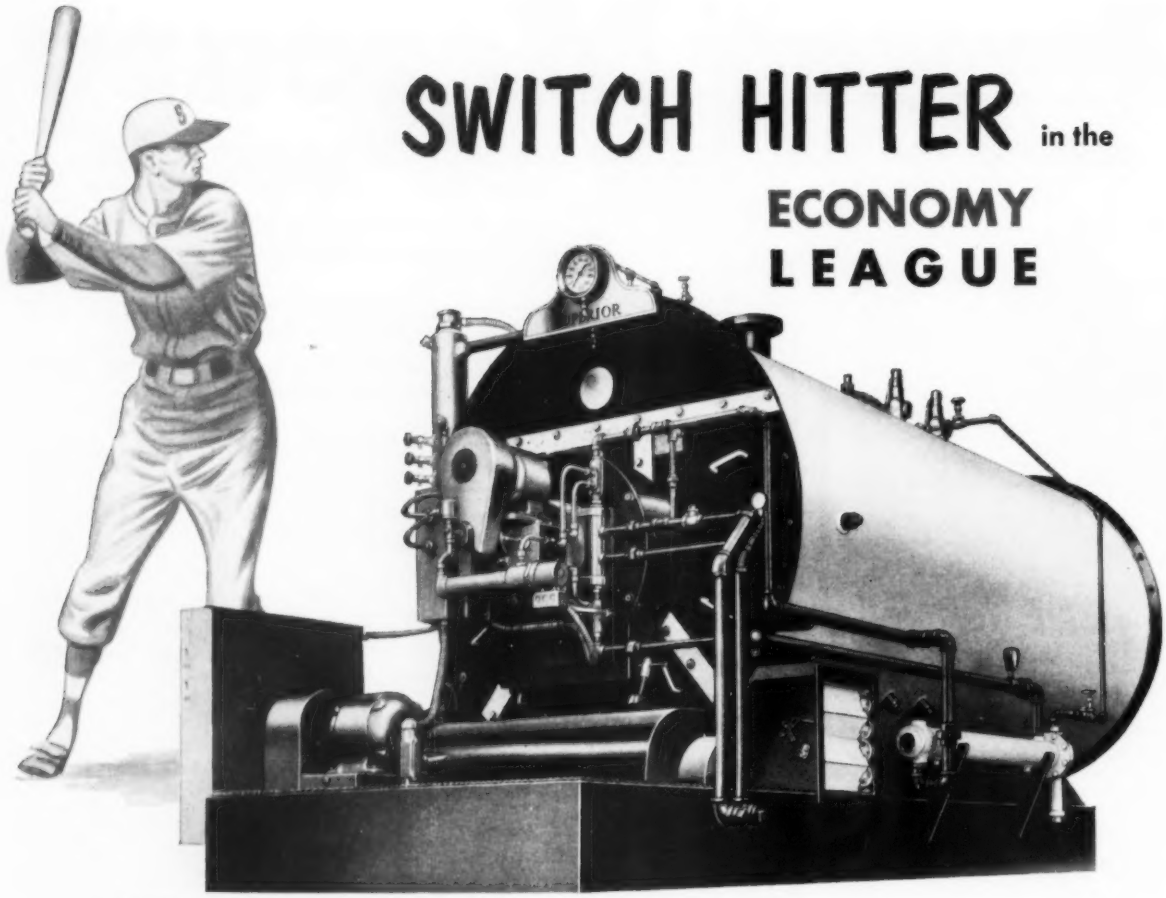

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(Continued from page 40)

Monel, and chrome plated steel, in spherical, elliptical and cylindrical shapes. Gives data on weights, buoyancies and collapsing pressures, also includes prices. Pictures connections. W. H. Nicholson & Co.

TOOLS, MACHINE SHOP EQUIPMENT

133 Pipe Tools—This 8-pp, quick-reference catalog covers the company's line of pipe and bolt threaders, square end sawing vises, pipe reamers, cutters, and pipe and bolt machines. Ordering specifications and prices are given. Fully illustrated, catalog also describes a new power drive. Beaver Pipe Tools, Inc.

134 Hard-Facing Electrodes—Twelve-pp Bulletin AR53-20 covers company's lines of hard-facing electrodes and hard-facing rods, offered in nine and four basic types, respectively. Practical, "how to do it" text features an application guide citing wear parts, types of wear, and correct electrode or rod to use in 13 major industrial applications on about 75 hard-facing problems. Alloy Rods Co.

135 Tips on Metal Cutting—This little 28-pp booklet tells how to cut metals with hand and power hack saws and with band saws. Gives rules for choosing and using hack saw blades and frames; shows how to saw; tabulates causes and cures for blade trouble; gives hints on use of power hack saw blades; explains number code for power blades; and tells how to adjust a band saw blade. Also recommends types of hand hack saw and power blades for cutting many standard materials. Lists types of blades to use with 66 different band saws. Clemson Bros., Inc.

136 Carbide Tools and Blanks—Brief-A-Log GT-265, 20 pp, is a condensed price list and catalog giving details on new price adjustments and specifications of the manufacturer's standard cemented carbide tools and blanks. Lists products affected by recent price cuts and provides necessary buying information. A visual-aid index divides tools from blanks and gives page number for each type. Carboloy Dept., General Electric Co.

137 Arc Welding Machines—Catalog 1340, 44-pp, describes more than 20 types of arc welding machines, including a-c, d-c and inert-gas models. Gives specifications, and electrical data, and lists acccessories and electrodes for particular jobs. Also discusses types of running gear, foot controls and an automatic arc welding head. Air Reduction Sales Co.

138 Milling Cutters and End Mill Holders—Condensed Catalog 2, 52 pp, pocket-size, describes manufacturer's standard solid high speed milling cutters and end mill holders. Each type of cutter or end mill is illustrated, and a condensed chart lists sizes, symbols and pertinent data. Brief descriptive text covers applications. Catalog also contains such new developments as heavy duty and mill adapter, its auxiliary equipment, and a quick change shell end mill adapter. A price list is included. Goddard & Goddard Co.

MATERIALS HANDLING

139 New Approach to Handling Problems—"Liftronics" is a 16-pp booklet covering the scientific analysis of materials handling problems and the application of industrial lifts to solve them. Presents actual applications of this approach along with installation photos of loading dock ramps, cross-over bridges, platform lifts and specialized types. The Wayne Pump Co.

140 Industrial Trailers—Featured in the new 12-pp Catalog TC53 are several new items including company's Lo-Deck trailer with a standard deck height of only 8 in. for greater safety and ease in loading. Other models in company's line of industrial trailers and wagon trucks for light- and heavy-duty use are also shown. Thomas Truck & Caster Co.

141 Logistics of Barrels—A system of industrial logistics covering procurement, production and distribution of barreled goods is the subject of this 8-pp bulletin. Discusses the selection of the proper container for the product to be transported and shows how company's trucks transport a variety of cylindrically-shaped objects. The Elwell-Parker Electric Co.

142 Conveyor Idlers—Book 2416, 48-pp, describes more than 500 belt conveyor idlers in 34 types, including light, medium and heavy duty 20-deg troughing idlers, 45-deg idlers, flat belt, belt training rubber cushion, and a new variable troughing idler. Return belt idlers and accessories are also shown. Tables give data on selection and spacing, based on weight and lump size of material to be conveyed. Schematic drawings and dimensional data are included for each type of idler. Book also lists flat roll idlers. Link-Belt Co.

143 Tongs and C-Hooks—This illustrated 24-pp booklet covers handling methods with tongs and C-hooks. Illustrations show the tongs lifting bales, barrels, boxes, warehouse racks, as well as bars, slabs, ingot, die blocks, coils, and ingot molds. Horizontal and vertical tilting of objects by the tongs is explained. C-hooks are shown in types for lifting coils and slabs. Suction tongs and motorized tongs are also illustrated. Heppenstall Co.

WATER CONDITIONING

144 Jet Tray Deaerator—Bulletin 28R-7980 gives construction features of a deaerator offering the combined advantages of a spray-type, direct-contact, first-stage heater performing as a direct contact vent condenser and primary deaerating mechanism, a second-stage jet atomizer, and a final tray-type deaeration section with reboiling action. Tells how this deaerator is being used in industrial power plants to remove corrosive gases from boiler feed water. Allis-Chalmers Mfg. Co.

145 Mixed-Bed Demineralization—Bulletin 126 explains in text and pictures how a mixed-bed demineralizer operates in producing high-purity water by ion-exchange method. Stresses company's simplified positive regeneration system which separates resins quickly and then remixes them. Barnstead Still & Sterilizer Co.

146 Deaerating Heaters—Bulletin WC-101A, 8 pp, covers spray-type deaerating heaters, stressing their importance as boiler safeguards. Explains operation of these heaters to show how they provide effective deaeration. Illustrated by photos and drawings of both vertical and horizontal models, text discusses first- and second-stage heater sections, performance results. Graver Water Conditioning Co.

147 Boiler Feed Water Deaeration—Eight-pp Bulletin 575 shows how company's zero-oxygen deaerators, capable of oxygen removal down to 0.005 cc/liter, offers efficient and economical deaeration for small and medium-size boiler plants. Explains how it operates, stresses low operating and maintenance costs, other advantages. Fred H. Schaub Engineering Co.

ENGINES

148 Diesel Design Features—Here's a 48-pp booklet giving detailed descriptions of

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PLANT ENGINEERING

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Use this space to ask for tear sheets, other information wanted.

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engineering design features to look for in diesel engines. In addition, ratings and descriptions of manufacturer's diesel models are presented. Some 19 pp show typical installations. Murphy Diesel Co.

149 **V-Type Engines**—Eight-pp Bulletin 197 gives construction and operating data on company's four-cycle Supairthermal V-type engines, designed to meet the need for a high-powered heavy duty diesel, dual fuel or spark-fired gas engine of moderate weight and small dimension. Describes features of these 2400- to 4260-hp engines, gives ratings of both 12- and 16-cylinder models. Nordberg Mfg. Co.

BOILERS

150 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with typical specifications. Combustion Engineering, Inc.

151 **Packaged Automatic Boilers**—Bulletin 1219, 16 pp, describes company's Powermaster packaged automatic boilers in 17 sizes from 15 to 500 hp for steam process and steam and hot water heating service. Stresses outstanding constructional and operational advantages of the boilers; describes firing equipment, control systems. Typical installation photos are included. Orr & Sembower, Inc.

THIS MONTH'S LITERATURE OF MERIT covers lamp replacement . . . materials handling analysis . . . hard facing metals . . . belt selection

152 **Group Lamp Replacement**—This 10-pp booklet, "Group Lamp Replacement Pays Off," is an illustrated case history report on group replacement plans currently in use. Recommends two methods, one based on replacement when lamps have burned a fixed percentage of their rated life; and the other, on replacement when lighting drops to an established minimum level. Such benefits as lower labor costs, longer performance of auxiliary equipment, lower accident rates, higher lighting levels etc. are discussed. Lamp Div., General Electric Co.

153 **Materials Handling "How" Book**—The new 28-pp revised edition of company's "How Book of Cost-Cutting Materials Handling" incorporates latest methods for analyzing operations in plants and warehouses. Contents are based on two analysis forms: the Vis-o-graf and the Vis-o-graf summary. These list factors to be considered when attempting to lower handling costs, and afford a means of collecting facts about operations and presenting the data in a graphic manner so as to simplify subsequent analysis and recommendations. Several Vis-o-grafs and Vis-o-graf summaries as well as a template ruler are included. The Yale & Towne Mfg. Co.

154 **Hard-Facing**—This 52-pp brochure presents an analytical study of hard-facing, its application and its wear-resisting qualities wherever impact and abrasive conditions exist. It incorporates data and instructions on hard-facing and information on company's hard-facing metals. An application index recommends specific hard-facing rods for equipment subject to impact and abrasion. Photos show application and procedure. A technical data section tells what metals can be hard-faced, and covers the effect of heat on metals, depositing single narrow heads. Mir-O-Col Alloy Co.

155 **Technical Data on Belting**—A new "simple-to-understand" 48-pp technical manual on transmission, conveyor and elevator beltings is being offered. Although designed primarily for engineers, each major division of the manual contains a general information section covering every aspect of each belting presented in simple question-and-answer style. In the engineering sections, various phases of belting are recorded in tables and charts, while diagrams clarify intricate problems. Available to qualified plant engineers, please state your job title. Boston Woven Hose & Rubber Co.

PUMPS, COMPRESSORS

156 **Gear Pumps**—Besides presenting all of company's standard gear pumps, 24-pp Bulletin 17-A describes briefly special types engineered for unusual requirements. Discusses design, construction and operation of the pumps; tells how they're used in the power and industrial fields. Drawings, action photos, capacity and pressure tables and performance data supplement the text. Schutte and Koerting Co.

157 **Centrifugal Pumps**—Bulletin W-300-B4 presents manufacturer's standard end suction centrifugal pumps which cover a wide range of applications and offer much interchangeability of parts. Includes charts showing the coverage provided by the six types in this line. Worthington Corp.

158 **Small Industrial Pumps**—Catalog 101, 12 pp, covers a line of small industrial pumps for lubricating, hydraulic, transfer, circulating and burning oils service. Presents the services, operating data and features for each model for easy selection of proper pump for a particular application. Dimensions and parts diagrams, performance data are included. Tuthill Pump Co.

159 **Industrial Air Compressors**—Eight-page Bulletin E-251 gives full data on company's industrial air compressors from 10 to 100 hp sizes with displacements of 55 to 540 cfm. Comprehensive table shows number of tools which can be operated by each size. Davey Compressor Co.

160 **Oil-Free Compressors**—Bulletin A-44, 8 pp, describes a heavy duty, vertical compressor, designed for applications where compressed air must be completely free of lubricating oil. It contains photographs, section drawings, and dimensions with specifications on manufacturer's complete line of non-lubricated compressors from 172 to 8800 cfm, 25 to 600 hp. Joy Mfg. Co.

HOSE

161 **Oil Hose**—Hoses described in this 8-pp bulletin cover applications for barge loading, oil suction and discharge, butane-propane, fuel oil, gasoline pump, tank truck, tank car and many others. Cross section and cutaway photos of products, struction and performance data are included. Quaker Rubber Corp., Div. H. K. Porter Co., Inc.

162 **Flexible Metal Hose**—Bulletin 15-D is designed to aid in selecting the hose best suited to the application. Includes illustrations of high pressure interlocking

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bronze and steel flexible hose, tar and asphalt hose, and loading and unloading hose and couplings. Lists current applications. Atlantic Metal Hose Co., Inc.

HEATING

163 Heating Specialties—Sixteen-pp Catalog H-99 features convenient and simple circulator performance curves, simple heater selection charts and information on all of company's heating specialties and accessories. Taco Heaters, Inc.

164 Selecting a Heater Exchanger?—Now available is a handy heat exchanger calculator for use in selecting this company's shell-and-tube type heat exchangers. Designed like a slide rule, it is used to determine square feet of surface necessary to transfer a given amount of heat between oil or water on the shell side and water on the tube side. It is applicable to standardized shell-and-tube single and multipass, fixed and removable tube bundle units. Young Radiator Co.

165 Water-Cooled Aftercoolers—This illustrated bulletin describes water-cooled aftercoolers for removing oil and moisture from compressed air systems from 100 to 500 cfm, giving dimensions and ratings. Also describes a separator for use with the aftercooler. Heat-X-Changer Co., Inc.

166 Coal, Ore Thawing Sheds—Featuring a dimension drawing of a typical 28-car shed arrangement utilizing three 6-million Btu heaters, this bulletin pictures some of these heaters of three- to 10-million Btu output, and lists their major advantages. Also lists several large thawing installations. Lee Corp.

OTHER EQUIPMENT

167 Specialty Resin—This new 12-pp technical booklet gives information on the use of Vinsol, a low-cost dark-colored resin, in a variety of applications. Discusses use of Vinsol in adhesives, asphalt emulsions, hydraulic cement, electrical insulation, protective coverings, other applications. Information about the forms in which this resin is available, and its properties are also presented. Hercules Powder Co.

168 Presenting Glass Fabric—"Glass Textiles for Industry," 32 pp, serves as an introduction to use of glass fabric in modern industry and lists 19 industries and fields in which these fabrics are finding increasing use. Discusses basic fiber glass textile form—broad fabrics, tapes and parallel strand reinforcements. Provides charts showing end-uses of these forms together with properties prompting the use for each end-product. Industrial Products Div., Hess, Goldsmith & Co., Inc.

169 Metal Shot as "Back-Up"—Of interest to plant engineers concerned with shell-molding process is Technical Bulletin 5 which covers the use of metal shot as a weighting or back-up material. Discusses characteristics of shot that make it desirable as "back-up"; gives results obtained from tests conducted to establish pressures exerted against the shell mold. Harrison Abrasive Div., Metals Disintegrating Co., Inc.

170 What's New in Binders—Shown in 40-pp Booklet LL234, "Binders that Build Business" are some 20 loose leaf binders for every reference purpose, also time-saving page indexes. Introduced along with the line of binders is a printing and embossing process which personalizes each binder. Remington Rand Inc.

171 Adhesives, Coatings, and Sealers—An eight-page bulletin lists the company's most important adhesives, coatings and sealers and enables a plant engineer to determine product best suited to his particular manufacturing problem. A chart under each product lists uses, application, colors available, base, solvent, viscosity, weight. Minnesota Mining & Mfg. Co.

172 Drafting Machines—This 20-pp booklet presents a description of gravity compensated, track type, and other drafting machines. Exceptionally well-illustrated, booklet shows how machines operate, and pictures and describes the company's latest points out specific design features. Also types of scales. Charles Bruning Co.

DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 39-40 and 191-192.

CONSTRUCTION

201 Glass Block Fenestration—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded variations, reverse draft and ventilation below window sill. Test data is summarized and recommendations included. Although test was conducted on glass block fenestration in school buildings, the information will be of interest to those concerned with industrial applications of glass block. Kimble Glass Co.

202 Heat Absorbing Glass—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating and maintenance costs. Mississippi Glass Co.

203 How to Glaze with Plexiglas—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this plastic sheet. Plastic Dept., Rohm & Haas Co.

204 Sandwich Panel Insulation—This folders discusses the use and advantages of Foamglas in sandwich panel construction. Tells outstanding properties of Foamglas and includes illustrated examples of its use. Pittsburgh Corning Corp.

205 Technical Manual on Plywood—Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

206 How Hardboards Improve Methods—Twelve-pp Form 5202, on production economies in plant maintenance, materials handling and processing, enumerates applications and specifies types and thicknesses of company's Presdwood for specific purposes. Lists 28 advantages of Presdwood, describes its use in architectural applications, bins, utility boards, cabinetwork, containers, booths and ventilators, work surfaces. Masonite Corp.

207 Metal Framing Guide—Although pocket-sized, 80-pp Catalog 800 is packed with illustrated information on an all-purpose metal framing system, and serves as a handy reference text. Fully indexed, shows the versatile basic channel, suggests possible combinations and pictures typical fittings and parts. Provides design and application data and pictures some of the almost unlimited uses for this framing system. Includes reference tables. Available to qualified plant engineers. Unistrut Products Co.

208 Flooring Guide—Plant engineers interested in specifying resilient tile flooring will find valuable information in Form 107. Tells what each type of resilient tile is recommended, and not recommended for. Specific information is given for asphalt tile, cork tile, rubber and grease-proof tiles. Kentile, Inc.

209 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features, gives fabricating data, sizes, allowable loads. Alan Wood Steel Co.

210 Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of predrilled fixtures. Remington Arms Co., Inc.

MAINTENANCE

211 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

212 Maintenance Manual—"Over the Rough Spots" is a 48-pp pocket size booklet giving the answer to practically every repair or building maintenance problem. Tells how to patch holes and resurface floors, how to prevent water seepage in underground foundations, repair leaky roofs, preserve concrete or wood surfaces, protect structural steel from rusting, and gives many time and labor saving methods. Generously illustrated. Stonhard Co.

213 Tar Base Coatings—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintenance purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

214 Protective Paints—Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.

215 Building Maintenance—Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

216 Proper Care of Floors—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well-written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, work, tile, linoleum, mastic wood. West Disinfecting Co.

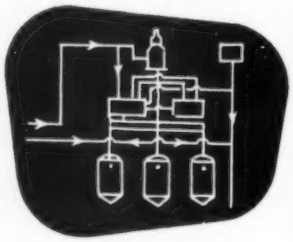
217 Floor Maintenance Buyers Guide—Brief, but practical application details on floor machines and accessories and a wide range of floor cleansers, waxes and other preparations are presented in this illustrated bulletin. Includes packaging information. Finnell System, Inc.

218 Vacuum of Many Jobs—Bulletin 144, 20 pp, describes and illustrates 132 unusual

How to select a PROTECTIVE COATING

CHECK RESISTANCE TO CORROSIVE MEDIA

How well a coating withstands the action of a given corrosive agent is the first factor you must necessarily consider in choosing the right coating for your needs — but it's *only* the first.



CHECK ADAPTABILITY TO SERVICE CONDITIONS

The second factor — and one you can't always predetermine by laboratory test — is on-the-job performance. That's governed, in turn, by the kind of metal you're protecting . . . the condition of the surfaces . . . how the equipment is constructed . . . conditions encountered during its operating cycle . . . during idle periods — considerations that must be surveyed in detail before you can select a protective coating with reasonable assurance it will successfully meet your requirements.

Dampney equipment-engineered coatings give you that assurance because they are formulated to do certain selective, specialized jobs both large and small, difficult and routine — to give you the protection that is right for you — not in a costly, custom-made material nor an all-purpose anti-corrosive, but in a coating *engineered for the equipment it is to protect.*

Dampney's industrial equipment knowledge is yours to call upon freely. Let us put it to work on your next coating problem.

MAINTENANCE FOR METAL

THE DAMPNEY COMPANY

BOSTON 36, MASSACHUSETTS

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DATA FILE

(Begins on page 193)

industrial uses for company's vacuum system. The Spencer Turbine Co.

219 Blower-Suction Cleaner—Data on a portable combination blower-suction cleaner for cleaning machinery, motors, stock bins is offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

220 Floor Scarifier—Bulletin 83.4 describes and pictures a new hydraulically equipped machine designed for removal of traffic-packed grimes from trucking aisles in industrial plants. Explains how it cuts, picks up grime in one operation; is one-man operated. G. H. Tennant Co.

SAFETY, SANITATION

221 Dry Chemical Extinguishers—New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

222 Advice on Washrooms—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms which are included in this service. Scott Paper Co.

223 Hand Dryer—Form 1123 describes and pictures a high-speed hand and face dryer for use in industrial washrooms. Tells special features, gives specifications. The Chicago Hardware Foundry Co.

224 Group Washing Equipment—Washfountains designed for modern group washing requirements for industrial plants, institutions are shown in Bulletin D-766. Bradley Washfountain Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

225 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, rachet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

226 Portable Spray Gun—An easily used and inexpensive spray gun pressurized with a CO_2 cartridge is featured in this single sheet bulletin. Sketches show the gun in use for painting, cleaning, other work. Sullivan-Becker Machine Co.

227 For Faster Fastening—Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.

228 Pipe Tool Ordering Guide—Catalog 2-51, 8-pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

229 Metal Spraying Gun—Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc

230 Resistance Welding—Featured in this 24-pp catalog are newly-designed tips and holders recently added to company's equipment. Full information is also given about other holders, tips, seam welder wheels and shafts, and bushings, in manufacturer's line, as well as flash, butt, barrel and projection welding dies. Ampco Metal, Inc.

231 Improved Cutting Oils—Cutting oils for keeping parts and tools up to 50 deg cooler and representing a new concept in non-emulsifying oils are described in two

NOBODY GUESSES

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When you see this fillet of alloy, **and the fitting is Walseal** you know that you have full penetration because the alloy comes from the inside.

Cutaway view of a Walseal Tee showing: 1 — **factory-inserted ring** of silver brazing alloy; 2 — fillet of silver brazing alloy that appears upon completion of Walseal joint; 3 — cutaway view of the completed joint showing that silver brazing alloy has flowed in **both** directions from the factory inserted ring.

When you join brass, copper, or copper-nickel pipelines with Walseal Valves, Fittings, or Flanges you know you have the *right amount* of the *correct type* of silver brazing alloy. The ring of Sil-Fos brazing alloy is *factory-inserted* in the ports of Walseal products at the time of manufacture.

No lost time or motion in handling the alloy . . . no difficulty in getting *full penetration* of the alloy regardless of the position of the valve or fitting . . . no guessing whether the joint is made right . . . the fillet of silver brazing alloy that shows up when the Walseal joint is completed, *comes from the inside!* And, whether you've made the joint yourself, or are inspecting the work of another, you know that if the silver alloy fillet is visible, *and the valve or fitting is Walseal*, you have full penetration. That's why nobody guesses when you use Walseal!

Walseal products are backed by the reputation of the Walworth Company, manufacturers of valves and pipe fittings since 1842.

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

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DATA FILE

(Begins on page 193)

new technical bulletins. Form A-2724 describes Sunicut 11-S and 209-S, non-staining dual-purpose oils primarily for medium duty and heavy duty operation on automatic screw machines. Form A-2723 covers Sunicut 102-S and 110-S, which contain active-type sulfur and are effective for heavy-duty operations. Sun Oil Co.

232 Automatic Deburring—This bulletin stresses the economy and efficiency of mechanical deburring with manufacturer's brushing machine. Two illustrated case histories show how the mechanical method cuts production costs. The Osborn Mfg. Co.

233 Data on Welding Rods—Data sheets 179, 211, 219 and 220 give properties, typical applications, corrosion resistance, and recommendations for grinding wheels and welding procedure covering four types of Rexweld hard surfacing welding rods for gas and arc welding. Crucible Steel Co. of America.

WATER CONDITIONING

234 New Data on Zeolite Softeners—Publication 4520-A is a recently revised edition of company's booklet on zeolite water softening. Provides a glossary of terms used in the process, data for laying out a zeolite softening plant, factors governing size of equipment, selection of zeolite materials and discussion of the four stages of operation of a sodium zeolite softener. Cochrane Corp.

235 Boiler Scale—Formation and Prevention—Technical Paper 98 is a 12-pp article covering the cause and prevention of boiler scale. Covers the mechanism of scale formation, effect of boiler scale, chemistry of scale formation, internal chemical treatment and chemical correctives. Diagrams of feeder systems, photos and solubility charts illustrate text. W. H. & L. D. Betz.

ELECTRICAL

236 Motor-Generator Reference Book—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their applications and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control, general characteristics. Allis-Chalmers Mfg. Co.

237 Industrial Motors—Twelve-pp Brochure 100 gives information on company's line of industrial motors. Construction details are discussed and drip-proof, splash-proof, totally enclosed and other types described and illustrated. Mechanical and electrical modifications possible are detailed and selection data included. Motor generator sets, brake motors, elevator hoist motors are shown. Electro Dynamics Div., General Dynamics Corp.

238 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors Inc.

239 Motor Controls—In this 28-pp bulletin the most important items in company's line of standard motor control apparatus for all industries are presented. Controls, starters and accessories are described and applications listed. Allen-Bradley Co.

240 The Answers on Wiring—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths, as well as a partial list of users included. General Cable Corp.

241 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct or a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, etc. Westinghouse Electric Corp.

242 Plug-In Power—Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

243 Power Distribution Feeders—Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

244 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

245 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual. Lists applications for these starters and pictures enclosures. Square D Co.

246 Power Distribution Practices—The 28-pp "Industrial Power Distribution Idea Book" (Bulletin GEA-5900) is a guide for plant engineers on electric power distribution practices in large and small plants. Covers utility distribution practices; methods of buying power; what to do when a choice of primary voltages is available; application of primary switches and circuit breakers; types and arrangements of pri-

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• During the last 30 years Bradley Washfountains have become the standard in plants in every part of the country,—of every size from a few dozen employees up to many thousands.

They are strictly sanitary; each of 8 to 10 persons accommodated simultaneously is furnished clean running water which is carried away (not collected) as it reaches the self-flushing big bowl.

FOOT-CONTROL *Prevents Contagious Faucet Contacts*

With foot-control *there are no faucets*, preventing all possible chance of transmitting germs by contact. Water is not wasted since supply is automatically cut off. Economies in space, piping installations and connections are readily apparent. BRADLEY WASHFOUNTAIN CO., 2273 W. Michigan St., Milwaukee 1, Wisconsin.

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BRADLEY Washfountains

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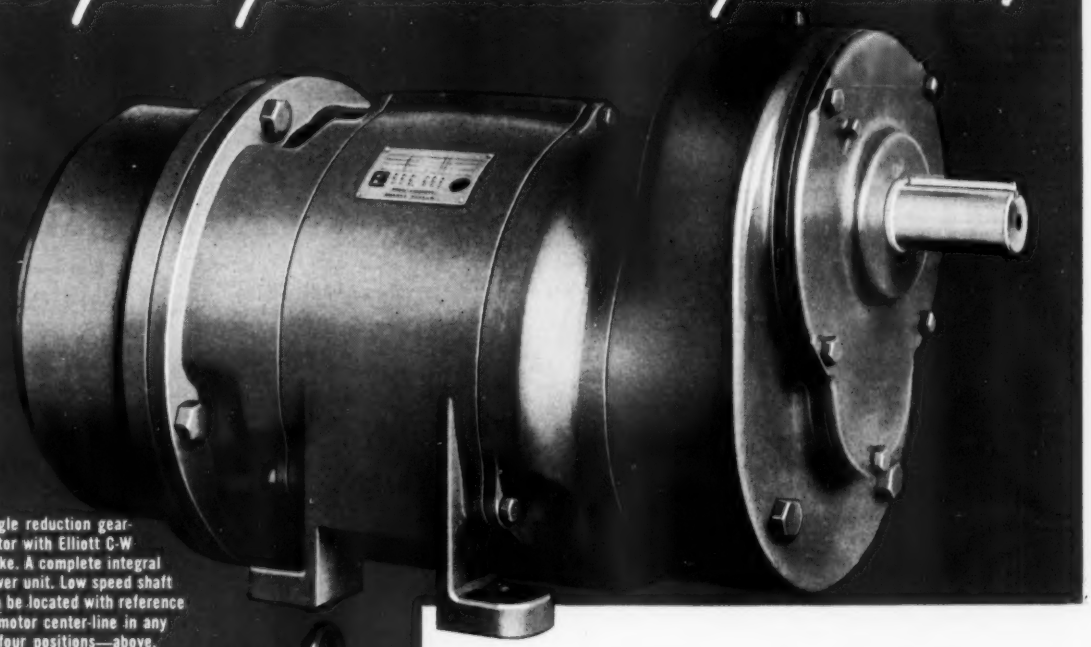
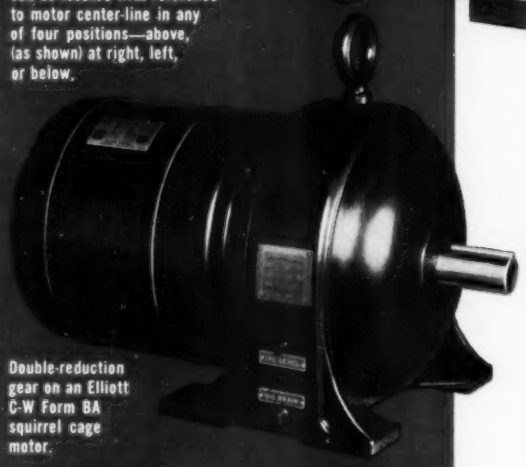


Single reduction gear-motor with Elliott C-W brake. A complete integral power unit. Low speed shaft can be located with reference to motor center-line in any of four positions—above, (as shown) at right, left, or below.



Double-reduction gear on an Elliott C-W Form BA squirrel cage motor.

Triple-reduction unit mounted on an Elliott C-W totally-enclosed fan-cooled "Sealedpower" explosion-proof motor.

W3-10

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Here is a complete line of motors with built-in reduction gear units which covers practically every need.

Available in any motor type, any enclosure, any mounting, in frame sizes from 1 to 150 hp.

Single reduction, 780 to 280 rpm... double reduction, 230 to 45 rpm... triple reduction, 37 to 7.5 rpm.

Construction features include precision processed, file-hard gears, large oil reservoir for abundant splash lubrication, heavy, rigid cast iron pyramidal base, and a bearing housing and oil seal *separating* the inner high speed motor bearing from the gear lubrication, which after much service may contain minute metallic particles tending to shorten bearing life.

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DATA FILE

(Begins on page 193)

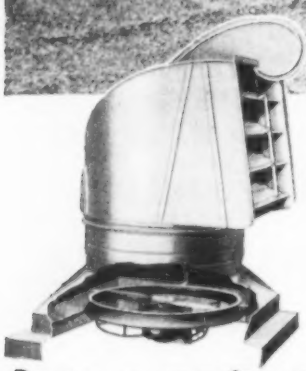
mary cables; and types of load-center distribution systems. Also discusses branch feeder switches, starters, and fuses, grounding of systems, interrupting capacity. General Electric Co.

247 Preventive Maintenance Tips—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls is given. Westinghouse Electric Corp.

248 Snap Action Switches—Catalog 82, 23 pp, on precision snap-action switches, presents safety, limit, and interlock types designed especially for switching a-c circuits in industrial applications. Covers heavy-duty limit switches, metal enclosed switches, some of which are sealed against dirt, dust, splashing. Micro Div., Minneapolis-Honeywell Regulator Co.

250 Electrical Equipment for Cranes—A complete line of electrical equipment designed exclusively for crane service is presented in 32-pp Bulletin C5-1. Covers everything from company's a-c Magnetorque crane control to current collectors, and is generously illustrated. Overhead Crane Div., Harnischfeger Corp.

251 Retractile Cords—This 8-pp bulletin presents retractile cords for general communication and power applications. Containing catalog data and ordering information as well as application photos, explains how the cords are made, where used, advantages. Koiled Kords, Inc.



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Power or gravity ventilation, as the load varies

Continuous positive (powered) ventilation of a highly effective type is available when you install Airjectors on your buildings. But where the type of activity within a room or building calls for only irregular use of power expulsion of heat, fumes or smoke, the Airjector acts as an efficient gravity exhaust.

Low cost operation results from the Airjector's unique combination of sensitive rotary head and propeller type fan—dual factors in achieving largest air-moving capacity per size of ventilator. Smaller units, in most cases, provide the desired results, thereby saving on first cost as well as in operation. Get the full story in our Bulletin AJ-D.

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Roof Ventilators and Ventilating Louvers

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

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LIGHTING, COMMUNICATION

252 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

253 How to Use Sound Signals—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a coding signal call system. Benjamin Electric Mfg. Co.

254 Lighting Fixtures—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting Inc.

MECHANICAL POWER TRANSMISSION

255 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

256 Improved V-Belts—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

257 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

259 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.

260 Coupling or Converter—To promote a better understanding of hydraulic couplings and torque converters, this 32-pp publication tells where couplings or torque converters should be used, and why, furnishing a source of facts on non-technical terminology. Covers meaning and characteristics of torque and effect on driving and driven equipment. Twin Disc Clutch Co.

261 Transmission, Conveying Equipment—Bulletin 53-110, 56 pp, is described as an abbreviated catalog on cast and steel chains, cast tooth sprockets, belt conveyor idlers and spray nozzles. It presents the story of corrosion- and abrasion-resistant Rex-Z-Metal, gives chain listings and prices and sprocket information. Take-ups, buckets, idlers, spray nozzles and chain attachments are also listed. A pictorial index is included. Chain Belt Co.

262 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliott Co.

MAGNETIC EQUIPMENT

263 Magnetic Selection Guide—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

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. . . comes the smooth-surfaced built-up roof

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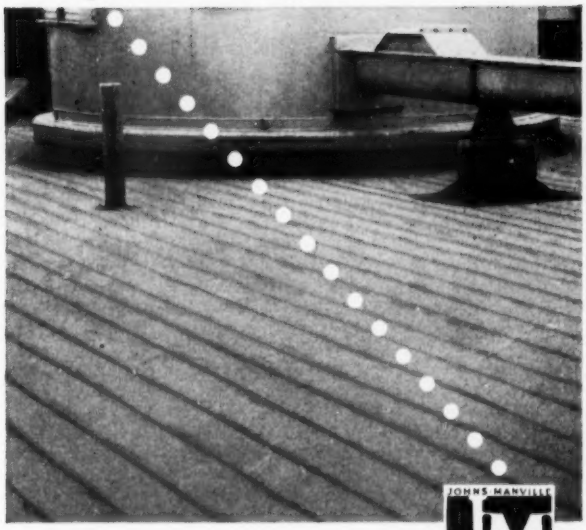
which provides a flexible covering of stone . . .



Because they are made of asbestos, the felts of a Johns-Manville Flexstone Built-Up Roof won't burn, rot or dry out from the sun. They need no periodic coating . . . provide lasting service and protection.

Flexstone Built-Up Roofs are *smooth-surfaced* . . . permit thorough drainage . . . make damage easy to locate and repair. These superior advantages are also provided by the J-M Flexstone *Special* Built-Up Roof . . . developed especially for dead-level decks.

For complete information about Flexstone Roofs and the J-M Asbestile* Flashing System that provides thorough water tightness and effective treatment for critical roof areas, send for folder BU-51A. Write Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ont.

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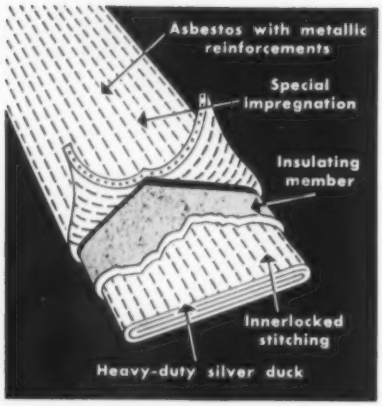
NEW armored belting resists abrasion and impact



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Insulated SAHARA Belts have long been famous for maximum heat resistance and long wear. Almost every plant that has tested these belts now uses them exclusively for handling hot materials.

Now Imperial is manufacturing Sahara Insulated *Armored* Belting with wire reinforcements that gives extra value at no extra cost. The reinforcing wire is spun together with the asbestos fibers. Result: maximum resistance to abrasion and impact, as well as heat.

Tell us your belting problem and we'll recommend the belt that will cost you less in the long run. In addition to heat-resistant belts, Imperial also makes job-designed belts for handling boxes, crates, grains and other bulk materials.

Write for Data Sheet 48-1A.

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(Also Super Insulated)

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Chicago 23, Illinois

Engineered belting
. . . the right belt for each job

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DATA FILE

(Begins on page 193)

264 Magnets in Stock—A complete listing of stocked sizes and shapes of Carboloy Alnico permanent magnets is provided in 20-pp Bulletin PM-100. Contains pull curve and size information in tabular form on both cast and sintered types, as well as sizes and application data on holding assemblies, including sheet steel separators, magnetic retrievers and stands. A list of available patterns for various sizes of cast Alnico bars, etc. is included. Carboloy Dept., General Electric Co.

265 Magnetic Pipeline Traps—Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from liquid flow lines and afford protection to processing equipment. Typical trap installation data given. Eriez Mfg. Co.

MATERIALS HANDLING

266 Data on Tramrail Equipment—Twelve-pp Form 2008F is a well organized booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

267 Engineered Monorail Applications—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

268 Handbook on Overhead Conveying Systems—Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.

269 For Overhead Handling—This 12-pp illustrated catalog covers motorized and hand operated cranes and monoralls engineered for efficient, low-cost handling. Special construction features are detailed; accessory equipment shown. Abell-Howe Co.

270 Materials Handling Equipment—Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.

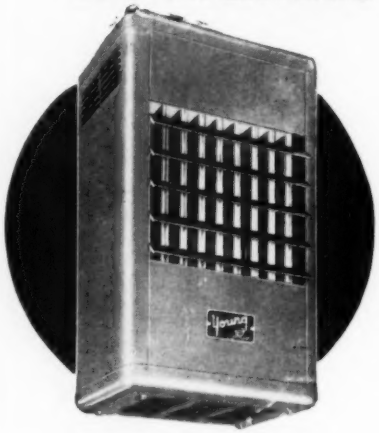
271 Metal Conveyor Belts—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

273 Tubular Conveyors—Form HC-541 contains about 44 pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives engineering data. Hapman Conveyors, Inc.

274 Fastenings for Conveyor Belts—This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

276 How to Pick a Truck—Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in

YOUNG
GAS-FIRED UNIT HEATERS



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- Corrosion-resistant Heat Exchanger is one-piece welded aluminized steel construction with interchanger tubes dimpled to stop warmup noises.
- Non-corrosive aluminized steel Combustion Chamber and Exchanger are welded into a single, leakproof assembly.
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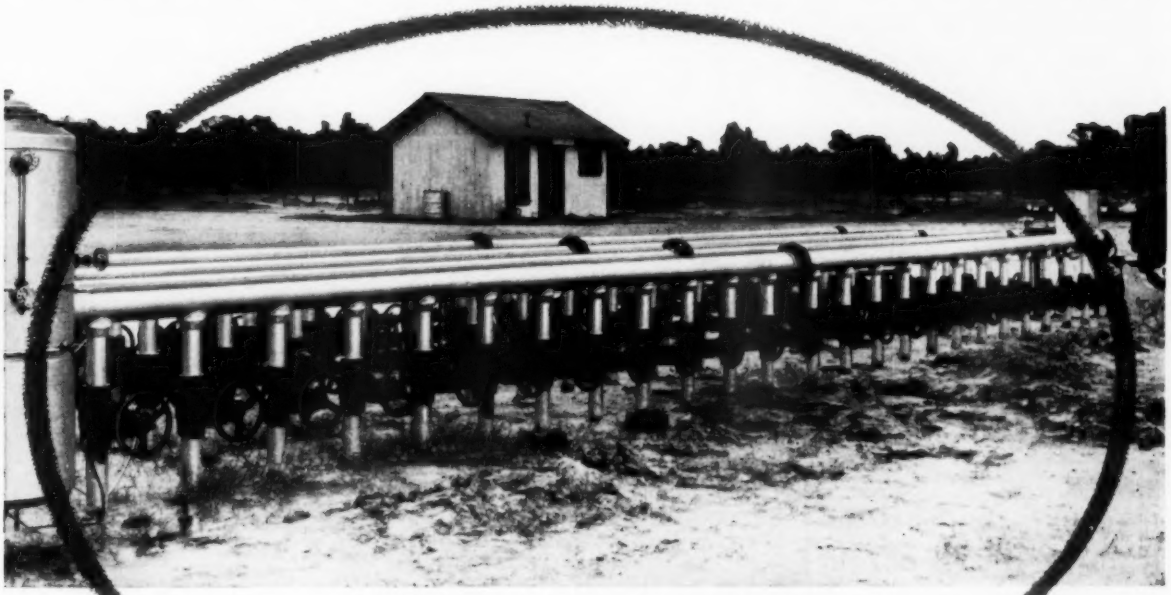
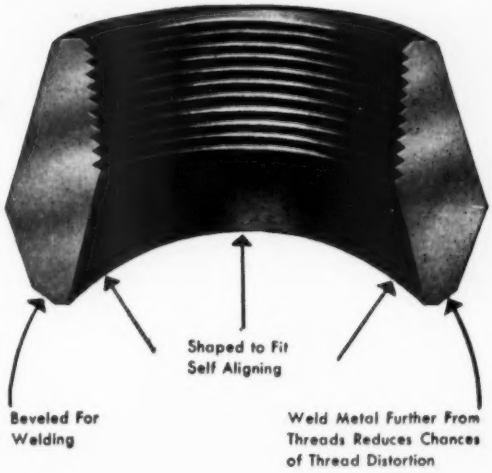


ThredOlets at work in L. P. Gas Plant Production Separators. 4" x 2" ThredOlets utilized for branch connections on manifolds subjected to contraction, expansion and vibration. The ThredOlet's short height and wide footing creates rugged branch construction.

Insure production economy in pipe fabrication through the *exclusive* features *engineered* and *manufactured into* ThredOlets and Socket WeldOlets. Production is boosted because you weld *more pieces* per hour!

Instant application and immediate availability will save you time, labor and money in constructing all 90° Threaded and Socket-weld branch connections.



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ThredOlets

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Pangborn Blast Cabinet—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60" x 35" in size. Models from . . . **$319** and up.

Pangborn Unit Dust Collectors—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . **$286** and up.

Pangborn Hydro-Finish Cabinets—Remove directional grinding lines, hold tolerances to .0001". Reduce further finishing of tools, molds, dies . . . **$1410** and up.

Write for details on these machines to: PANGBORN CORPORATION, 3200 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

Pangborn

BLAST CLEANS CHEAPER

For more facts circle 636 on Reply Card

DATA FILE

(Begins on page 193)

the booklet show at a glance complete specifications on each of company's trucks, and illustrate important construction and design features. The Baker-Raulang Co.

277 Industrial Truck Reference Guide—Bulletin 300, 44 pp, covers company's line of current model tractors, trailers, fork lift trucks, platform lift trucks and load-carrying trucks. Major categories are: the trackless-train system; the fork-truck pallet system; and the lift truck-skid system. Each category is preceded by an analysis of applications and merits of the handling system. Mercury Mfg. Co.

278 Industrial Logistics—Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

279 For "Floor Level" Handling—Junior Catalog 535 is the 100-pp eleventh edition of company's well known pocket-size catalog. Contains information, illustrations and specifications on fork trucks, high lift electric trucks, pallet trucks, industrial tractors, electric and hand lift trucks, steel'eg skids and boxes, semi-live skids and lifters, portable elevators and cranes, stacking frames, storage racks, die tables, handling specialties. Barrett-Cravens Co.

280 Stand-Up Fork Lifts—Complete specifications are available on stand-up fork lift trucks in 2000- and 3500-lb capacities. These trucks feature easy maneuverability and manufacturer's Lev-R-Matic drive. Mobilift Corp.

281 How to Operate a Crane—Booklet 920 is a 48-pp generously illustrated instruction book on crane operation, helpful to both beginner and seasoned operator. It shows hand signals, defines crane and hoist terminology. Covering all phases of crane operation, it discusses in detail the co-ordination of crane motions and includes safety rules and inspection, maintenance tips. Individual copies of this book are free to qualified plant engineers. The Electric Controller & Mfg. Co.

282 Industrial Lifts—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, truck service lifts. The Wayne Pump Co.

283 Portable Hoists—This bulletin describes a lightweight air hoist in 2000, 100, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.

284 Chain Hoists—Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists described separately. Reading Crane & Hoist Corp.

285 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

286 Data on Truck Casters—As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

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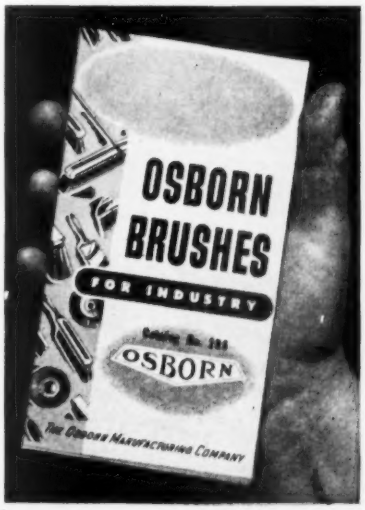

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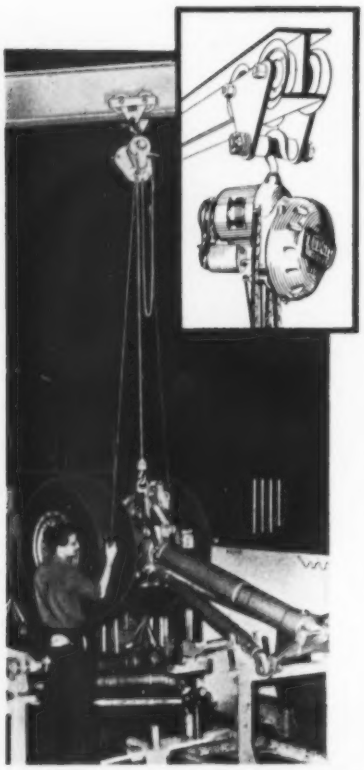

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Help manpower do more. Let the speed and efficiency of the 'Budgit' Electric Hoist step up defense and civilian production. The ¼-ton size lifts the full load in less than two seconds. All it takes to start this fast lifting action is a slight pull on the control cord with one hand. No muscle strain. Hoisting is easy, safe. A 'Budgit' Hoist lifts all day for a few pennies' worth of current.

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A 'BUDGIT' I-BEAM TROLLEY

makes any hoist more useful. Tough steel construction. Ball bearings in wheels. Adjustable to fit several sizes of I-beams. Capacities: 500 to 4,000 lbs. Priced from $15.50. Write for Bulletin 390.

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DATA FILE

(Begins on page 193)

287 Trucks, Casters, Wheels—Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

288 Shovel and Loader—Described in 12-pp Bulletin 1932 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

289 Trolley Hoists—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

290 For Hopper Economy—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers, showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

LUBRICANTS, LUBRICATION

291 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.

292 Versatile Industrial Oil—Described in 20-pp Form AD 4078 is an all-purpose oil offering protection for a wide range of industrial equipment, and available in 15 viscosity grades. Discusses six major characteristics of the oil; explains and pictures its use in hydraulic systems, speed reducers, air compressors, electric motors, hydraulic turbines, bearing systems, etc. A chart shows grades and uses, physical properties. Standard Oil Co. (Ind.)

293 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

PUMPS, COMPRESSORS

294 Installing a Pump—Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

295 Pump Service Manual—Bulletin 202 is a 20-pp booklet covering installation, operation and maintenance of manufacturer's reciprocating pumps and providing helpful engineering information. Suction piping, valves and accessories for proper operation are discussed. Sectional drawings and parts lists are provided, also high and low capacity stream consumption curves, general information on water, properties of steam. Warren Steam Pump Co., Inc.

296 How to Solve Pumping Problems—A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construc-

RESEAT VALVES AND BIBBS

PAYS FOR ITSELF ON FIRST 2 OR 3 JOBS!

Don't junk expensive globe or angle valves, bibbs, fixtures—reseat them! Order Skinner *Valve and Bibb Reseater*. Easy to use. Guaranteed cutters leave seat glass-smooth, level, tight.

1/4" to 2" $47.75
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An easier faster better way to thread 1" to 2" pipe . . .

WITH POWER!

This light (26 lb.) compact Portable Power Pipe Threader goes to the job — is ***operated with a ½" portable electric drill.*** 1 set of High Speed Steel Chasers does all sizes—just move indicator to 1", 1¼", 1½", or 2" marking. Clamp on pipe and apply drill to drive square. The rest is automatic. Operating on anti-friction bearings with automatic lead, it's a ***fast***, easy way to get smooth, accurate threads.

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Don't let cord failure spoil your product performance

specify new Rome 50

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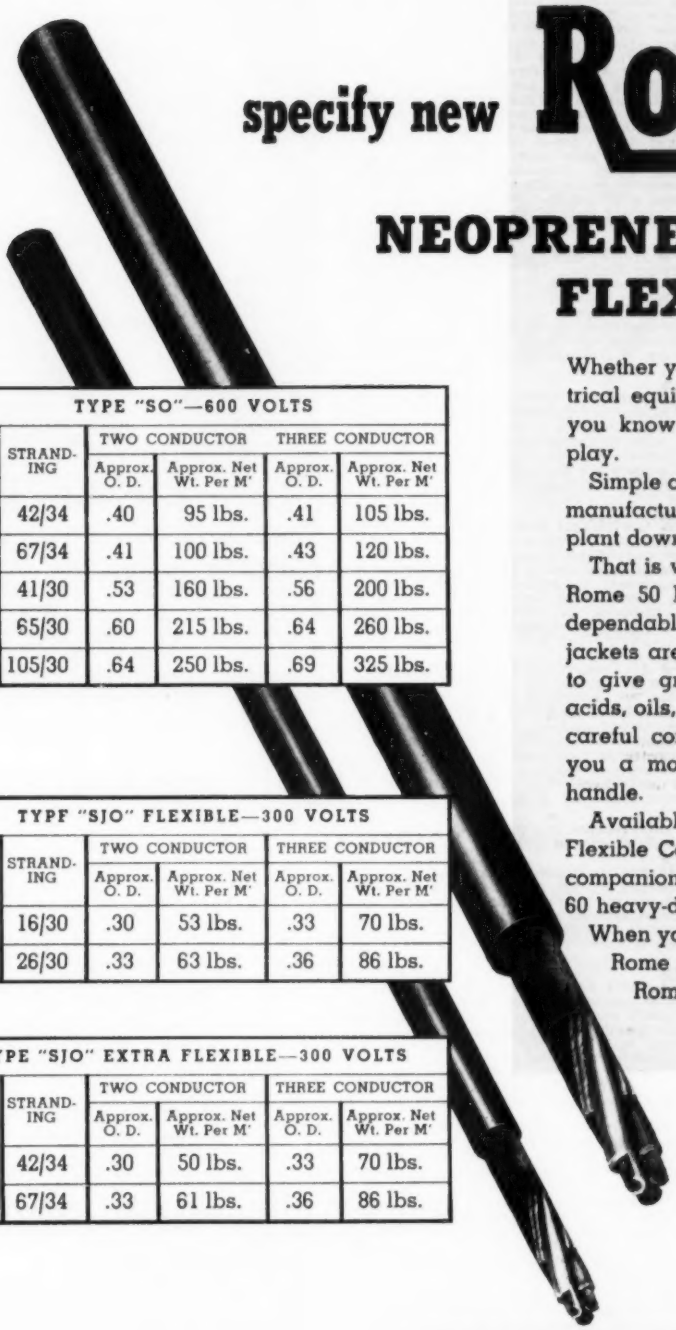

TYPE "SO"—600 VOLTS					
SIZE A.W.G.	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	42/34	.40	95 lbs.	.41	105 lbs.
16	67/34	.41	100 lbs.	.43	120 lbs.
14	41/30	.53	160 lbs.	.56	200 lbs.
12	65/30	.60	215 lbs.	.64	260 lbs.
10	105/30	.64	250 lbs.	.69	325 lbs.

TYPF "SJO" FLEXIBLE—300 VOLTS					
SIZE A.W.G.	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	16/30	.30	53 lbs.	.33	70 lbs.
16	26/30	.33	63 lbs.	.36	86 lbs.

TYPE "SJO" EXTRA FLEXIBLE—300 VOLTS					
SIZE A.W.G.	STRANDING	TWO CONDUCTOR		THREE CONDUCTOR	
		Approx. O. D.	Approx. Net Wt. Per M'	Approx. O. D.	Approx. Net Wt. Per M'
18	42/34	.30	50 lbs.	.33	70 lbs.
16	67/34	.33	61 lbs.	.36	86 lbs.

Whether you are manufacturing original electrical equipment or specifying replacements, you know the important part flexible cords play.

Simple cord failure can injure an equipment manufacturer's reputation and can cause costly plant downtime.

That is why it will pay you to specify New Rome 50 Flexible Cords. You can count on dependable cord life because their Neoprene jackets are specially compounded and cured to give greater protection against sunlight, acids, oils, moisture, abrasion and flame. This careful compounding and curing also gives you a more flexible cord that is easier to handle.

Available in Types SO and SJO, Rome 50 Flexible Cords are economically priced as a companion line to Rome's quality-proven Rome 60 heavy-duty cords and portable cables.

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1,000-LB HOIST WEIGHS ONLY 30 LB

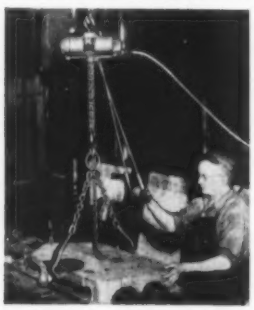
It's as easy as that to carry and hang

KELLER Air Hoist

One man handles it easily... makes replacements in minutes... avoids "down time" that might keep a whole department idle.

VARIABLE SPEED with fingertip control—spots loads accurately.

CAN'T BURN OUT from stalling. Not affected by dust and fumes. Maintenance costs are negligible!



Spotting heavy parts on a planer table

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KELLER Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

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DATA FILE

(Begins on page 193)

tion materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

298 For Abusive Pumping Jobs—Catalog 4906, 36-pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit use. Nagle Pumps.

300 Multi-Stage Compressors—Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centifugal compressor applications. Clark Bros. Co., Inc.

301 Improved Compressor—How this manufacturer's Spiraxial compressor for air or gas is designed to provide peak efficiencies with minimum servicing is explained in Bulletin SC-152. Construction and design details are discussed in detail. Roots-Connersville Blower.

302 Centrifugal Compressors—Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements and methods of control are presented. American Blower Corp.

303 Air Compressor Selection Data—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

PACKINGS, SEALS, GASKETS

304 Buyer's Guide on Packings—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

305 Shaft Seals—Form 455, 12 pp, presents a mechanical seal that rotates with the shaft and is designed to meet sealing requirements of centrifugal and rotary pumps, agitators, blowers, other rotating equipment. Explains advantages of these seals, gives recommended uses for six types, also for a double seal and a cartridge sleeve seal. Durametallic Corp.

306 Packings and Gaskets—In this 40-pp belting and packing manual (NY-2697-P) are helpful charts plus information on the care, use and maintenance of rod and sheet packings and gaskets. A complete engineering section contains all necessary charts and tables for determining working specifications of packings. Also included are packing recommendation charts. New York Belting and Packing Co.

307 Industrial Gaskets—This highly informative 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co.

308 Long Wearing Piston Packing—Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

The new HERMAN NELSON GAS FIRED Unit Heaters are made in seven sizes with heat output ranging from 20,000 to 160,000 B.T.U.'s per hour.

For some "HOT NEWS" on these new heaters write to.....

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FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/8" to 1/2" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

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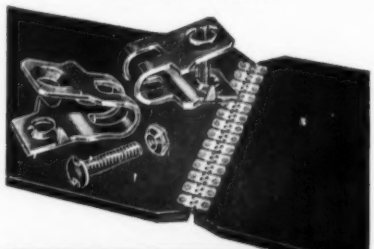

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Setol Cleanser HAS WHAT IT TAKES TO MACHINE-SCRUB OILY FLOORS—

Faster cleaning action!

Cuts operating time of the scrubbing machine

Finnell 213P Scrubber-Vac

Applies cleanser, scrubs, and picks up — in ONE operation!

Because *Setol* is specially compounded for the greater speed of *combination-machine-scrubbing*, it must *and does* work faster than average alkaline cleansers. *Setol* saponifies *and emulsifies* grimy oil and grease *instantaneously*. The wetting agent in *Setol floats the oil* for fast, easy, *and thorough* removal by the vac of a *combination machine* or with a separate vac unit. And because *Setol* stays fast-acting longer—does not spend its strength quickly as do ordinary oil and grease solvents — less is required to clean a given area. Thus *Setol* saves on materials and, by speeding the cleaning process, cuts operating time of the scrubbing machine . . . reduces labor costs . . . and saves on brushes. Best of all, *Setol gets floors oil-free clean!* Also acts as a disinfectant (contains pine oil), and leaves a pleasant, clean aroma.

- **A constant, fast-acting cleanser for machine-scrubbing cement, wood, wood block, metal, stone, and terrazzo floors**
- **Consistent use on cement floors prevents cement dusting . . . provides a finish that helps seal out waste materials**

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5309 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Originators of Power Scrubbing and Polishing Machines

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DATA FILE

(Begins on page 193)

309 Metallic Packing—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co.

INSTRUMENTS, CONTROLS

310 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

311 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

312 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

313 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.

314 Industrial Controls—Catalog 8305, 84 pp, describes and illustrates non-indicating electric, electronic and pneumatic controllers for temperature, pressure and humidity; also pneumatic and electric valves, switches and relays. Indexed and compiled for easy use, catalog provides specifications, dimension drawings, application data and ordering information. Industrial Div., Minneapolis-Honeywell Regulator Co.

Postage-free Reader Service Cards make it easy to order any of this literature. See pages 39-40 and 191-192.

315 Electrical Instruments—A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.

VALVES, TRAPS, PIPING AND ACCESSORIES

316 Valves and Fittings—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

317 For Quick Valve Selection—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb-indexed, includes pressure-temperature chart. The Ohio Injector Co.

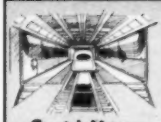
PLANT ENGINEERS PREFER

Schmieg CENTRI MERGE INDUSTRIAL EQUIPMENT

Schmieg DUST and FUME CONTROL EQUIPMENT

Completely automatic Centri-Merge units are designed and engineered to your specific requirements, to maintain the cleanest dust- and fume-free working conditions. Compact, self-contained equipment occupies a minimum of valuable floor space, saves on upkeep.

Schmieg SPRAY BOOTHS



Designed, built and installed to synchronize with your production line. No fire hazard with a Centri-Merge; overspray carried away in a whirling tornado of water. Safe, clean, efficient, economical; adapted to any conveyor equipment, overhead or floor.

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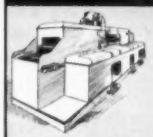

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Safeguard your product quality with Schmieg drying and baking-ovens. Every operating essential carefully designed and engineered to give you the very best finishing job. Any size, shape or type of oven, conveyor or box, for any installation arrangement.

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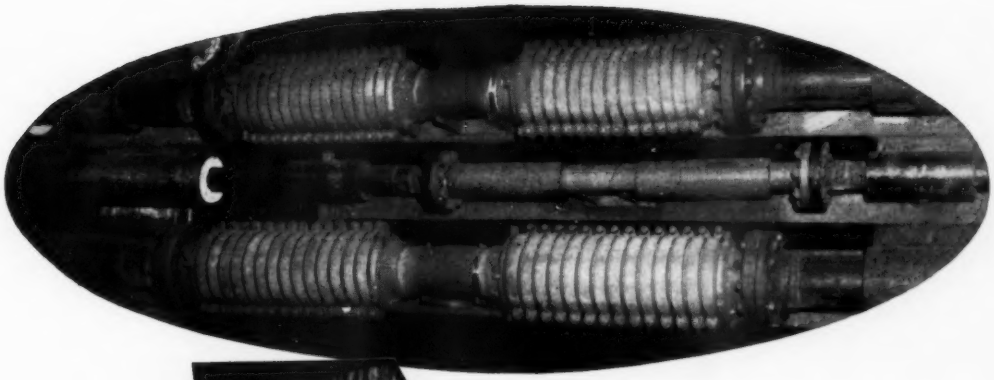
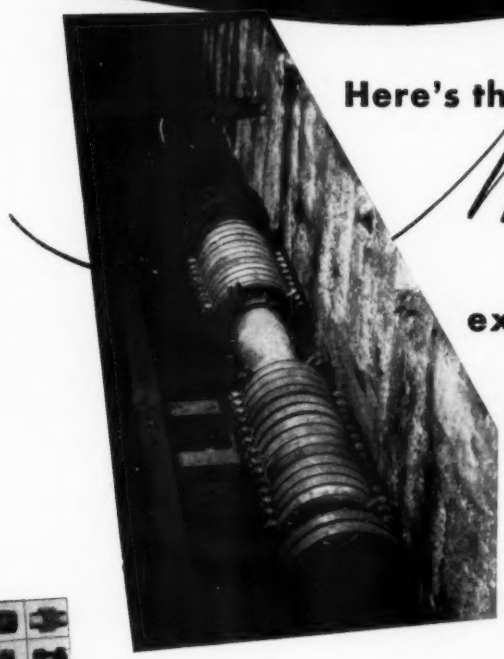




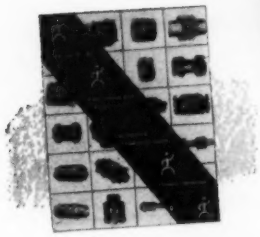
Here's the *Modern way*

to control piping expansion and contraction—

FLEXON

EXPANSION JOINTS

save space . . . require no maintenance . . . save time and money!



Here's your guide to PIPING MOTION CONTROL

The Flexon Expansion Joint Design Guide gives detailed specifications, and selection and application data for Flexon Expansion Joints. Write for your copy or see Flexon Expansion Joint Catalogs in Sweet's, Chemical Engineering Catalog and The Refinery Catalog.

You can have all the advantages of leakproof, maintenance-free pipeline motion control in a compact, easy-to-install, in-line unit when you use Flexon Expansion Joints. There is no repacking . . . no bulky, space-consuming installation . . . just install the Flexon Expansion Joint as easily as putting in a fitting, and then forget it.

Flexon Expansion Joints are offered with stainless steel or copper pressure carriers in Controlled-Flexing, Free-Flexing or Flexoniflex types. Units are available for pressures up to 5500 psi, temperatures to 800° F. (1600° F with special alloys). All types suitable for handling radial, axial and/or lateral pipe motion.

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Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.

Flexible metal hose

Expansion joints

Aircraft components

Metallic bellows

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There are lots of ways to Humidify your Plant

. . . but these companies use Armstrong Steam Humidifiers

• ARMSTRONG HUMIDIFIERS introduce clean dry steam directly into the atmosphere—automatically increase humidity to keep it within 1% or 2% of the desired level. They are easily connected to existing steam and electrical or air systems, cost from a few pennies to perhaps $1.00 per day to operate depending on size of unit. A unit capable of supplying 60 lbs. of moisture per hour lists at only $182.25 complete with control.

Why delay? *SEND FOR BULLETIN 1774* giving complete details and prices.

Partial List of Users:

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"Metallize 'em and forget 'em"

want to forget about rust for 20 years?

Pure zinc or aluminum, molten-sprayed on iron or steel surfaces, provides complete, dependable protection against atmospheric corrosion for upwards of 20 years without further maintenance. Such coatings are *mechanically* bonded to the surface—adhesion is *not* dependent on volatile vehicles or binders. Scaling, crazing, blisters, are eliminated. Protection is positive. "Metallize 'em and forget 'em!"

Why not find out more about how you can forget rust for 20 years or more? For descriptive Bulletin 62B—or the name of your nearest Metco Systems contractor—write or wire.

**Reg. U.S. Pat. Off.*

the Metco* Systems—a series of 18 basic engineering specifications developed over 19 years of experience with pure zinc and aluminum coatings on many different types of structures and equipment. The *Metco Systems* provide for standardization of surface preparation, metal coating thicknesses and organic aftercoatings for various service conditions and appearance requirements

Metco Systems Dept. P, 38-14 30th Street Long Island City 1, New York

For more facts circle 651 on Reply Card

DATA FILE

(Begins on page 193)

319 Valves for Processing—General Catalog 1500 B, 20 pp, describes in detail the operation and performance of all of company's single seated valves—the Domotor, electro-pneumatic, handwheel and combination models. Optional assemblies for specialized applications are shown. Application information, operating characteristics given. The Annin Co.

320 Efficient Flow Control—Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, water, gas and low pressure steam. Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

321 Bronze Valves—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions and specifications. Walworth Co.

322 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.

323 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

324 Steam Trap Book—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

325 Steam, Air and Gasoline Traps—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and

GAGE GLASSES AND HIGH PRESSURE RUBBER GASKETS
ALL SIZES TO FIT YOUR GAGES

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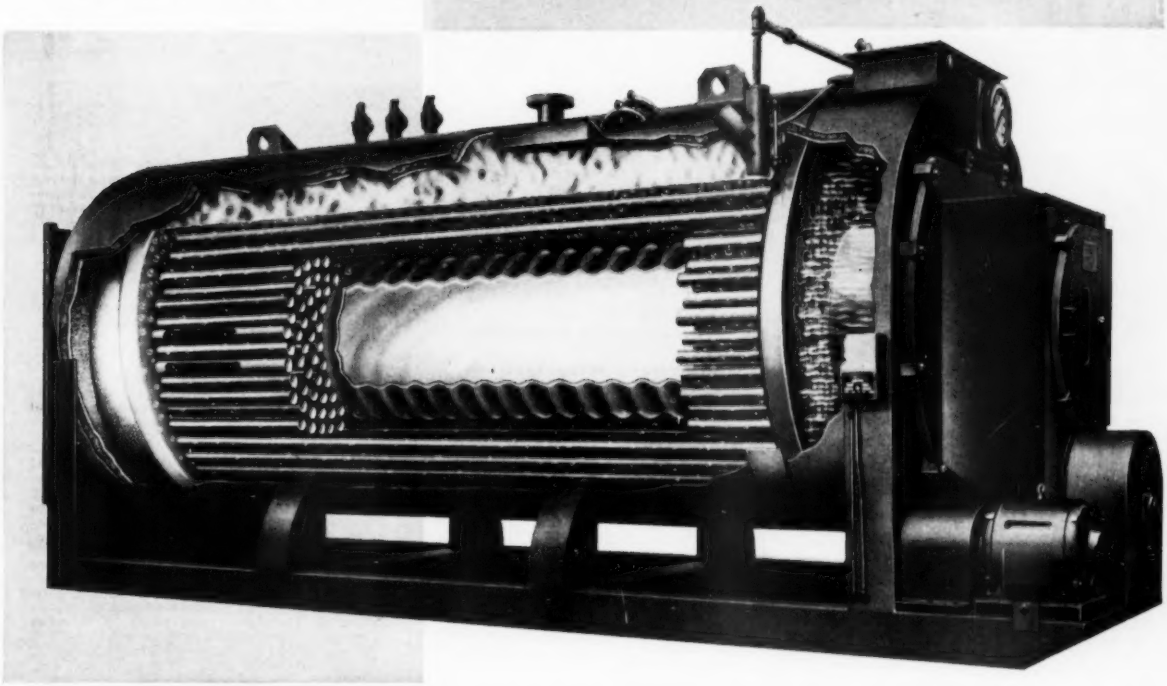
Do You Know About *Continental's* Two Pass Design?



...and do you know it takes one man less than 30 MINUTES to open a CONTINENTAL BOILER for cleaning or inspection...

WITH THE CONTINENTAL, you get a self-contained, automatic steam generator, built of best quality steel, and featuring advanced two pass design. The two pass design eliminates baffles that may break during operation and cause gases to short circuit and destroy efficiency.

WITH THE CONTINENTAL, 80% efficiency is guaranteed. Also, the use of forced draft and the elimination of baffles results in uniform distribution of heat through all tubes . . . insuring long life because all tubes do equal work.

WITH THE CONTINENTAL, you'll hold boiler down-time to a minimum because the clean-out and inspection doors at both ends are hinged and can be easily opened by one man in less than ½ hour.

WITH THE CONTINENTAL, fuel is fired directly into the firing tube which is completely surrounded by water. There is no dutch-oven and there is *no* refractory-lining in the water-backed furnace. This gives you maximum heat transfer, complete combustion, a high CO_2 and a low stack temperature. By eliminating refractory in the furnace, heat is transmitted to the boiler water without being stored and wasted in heating a refractory firebox . . . Steam with less than ½ of 1% moisture is assured in high pressure boilers, and less than 1% moisture in low pressure boilers.

WITH THE CONTINENTAL, you save on fuel (U. S. and foreign patents pending on exclusive firing method). The *oil burner* uses a pressure atomizing nozzle which is easy to service—has no cups or moving parts to wear out. The *gas burner*—rather than premixing—mixes fuel and air at the point of ignition, producing a uniform, highly radiant flame.

WITH THE CONTINENTAL, you get a boiler which, before shipment, is test fired and adjusted for maximum performance. No special stack or foundation required.

Continental Boilers, for high or low pressure, oil or gas fired—or combination thereof, range from 20 to 500 hp. Write for catalog 102.

CONTINENTAL is sold, installed and serviced by competent distributors throughout the U.S.

BOILER ENGINEERING
AND SUPPLY COMPANY, INC.
2 Manavon Street • Phoenixville, Pa.
40 Years of Boiler Experience

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For more efficient . . .

LIQUID HANDLING

USE...

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XACTO . . . the world's most widely used meter!

If you measure liquids, you need Bowser XACTO meters. Many hundreds of users — handling hundreds of different liquids — have found it to be the easiest, most efficient, accurate and dependable method of control they have ever used. XACTO can do the same for you!

Push-button operation delivers predetermined quantities — eliminates guesswork — will even print a delivery ticket when desired.

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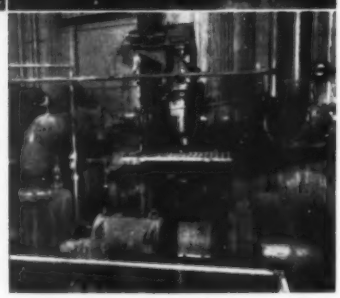

AT UNION POWER CO.'S VENICE, ILL. POWER PLANTS

13 Nagle Pumps HANDLE THE TOUGH JOBS

Eleven 8" type "T" horizontal shaft pumps handle abrasive fly ash and water—A 4" and a 1" type "SW-OB" vertical shaft pumps handle pumping of river water and gritty drainage. Many power plants—and other plants with abusive pumping conditions—have found Nagles both efficient and ultimately economical. Send for "Nagle Pump Selector".

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NAGLE PUMPS, INC.

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PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

For more facts circle 653 on Reply Card

DATA FILE

(Begins on page 193)

formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

326 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

327 Unions and Fittings—Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. Dart Union Co.

328 Steel Unions—This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Clayton Mark & Co.

330 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

331 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.

332 Handbook on Fittings, Flanges—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

333 Packless Expansion Joints—Bulletin 33-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

334 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

335 To Stop Those Leaks—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. M. B. Skinner Co.

VIBRATION CONTROL

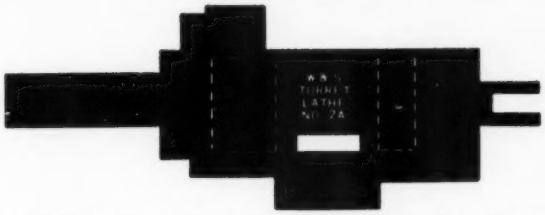
336 Engineered Vibration Control—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co.

337 Simplified Isolation—A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost. The Felters Co.

NEW!!

Adhesive-Backed Repro-Templets on Film

8c TO 12c EACH



Individual ¼"-scale Repro-Templets are now available for any one of 10,000 machine-tools or pieces of shop equipment.

By a new, exclusive method, these Repro-Templets are backed with a permanent pressure-sensitive adhesive . . . enabling you to use your templets over and over again.

Used in conjunction with film grid sheets, these Repro-Templets—at 8c to 12c each (average cost)—provide a simple, low-cost, standardized layout system for any metal-working plant.

Repro-Templets of machine-tools are furnished in sheets of 6 identical templets @ $1.00 per sheet. Shop and office equipment are furnished in sheets of identical templets which vary from 12 to 24 identical templets. These, too, cost $1.00 per sheet.

Repro-Templets are now so inexpensive as to be expendable . . . don't waste any more drafting or lettering time . . . write for complete catalog listing 10,000 Repro-Templets of standard machine-tools and shop equipment, plus prices of grid sheets, layout tape, etc.

Repro-Templets are manufacturer-checked for accuracy ! ! !

REPRO-TEMPLETS INC. OAKMONT, PENNA. (ALLEG. CO.)

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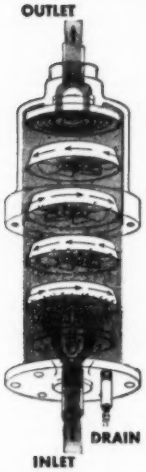
EQUIPMENT LASTS LONGER
. . . PERFORMS BETTER . . .
when the

ARIDIFIER

SCRUBS, CLEANS AND DRIES
On Air and Gas Lines



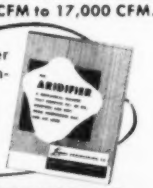
LASTS LONGER because . . .
The Aridifier's patented centrifugal-baffle action traps 92% of all dirt, oil, scale and water in gas or compressed air . . . and drains off these troublemakers *before* they can damage tools and equipment.

PERFORMS BETTER because . . .
The Aridifier protects tools against the freezing, fouling, caking and corrosion caused by dirt and foreign matter . . . assures the clean, dry air and gas that means better spray work, painting, lacquering, sand blasting, air cleaning, and similar operations.

Easily installed, the Aridifier maintains itself. 10 models. Capacity range; 7 CFM to 17,000 CFM.

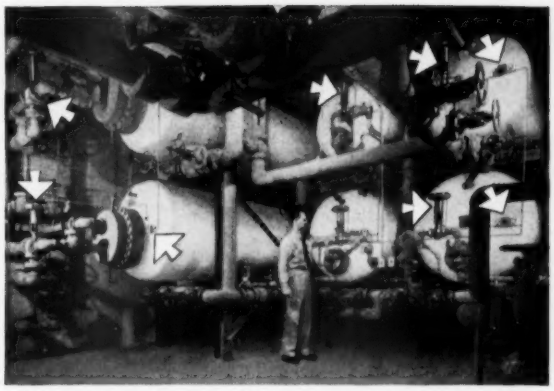
Learn HOW the Aridifier scrubs with a patented centrifugal-baffle action.

Write for This Catalog Now!



Logan ENGINEERING CO.
4907 W. Lawrence Ave., Chicago 30, Ill.

For more facts circle 656 on Reply Card



Water Heaters Controlled by Powers Accritem Regulators

What's Your Water Temperature Control Problem?

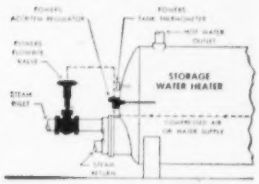
POWERS . . . with their many types of thermostatic regulators and 60 years experience is well qualified to help you find the right type of control for these applications:

Forced Hot Water Heating Systems; various types of Water Heaters and Heat Exchangers; Jacket Water Cooling for Air Compressors, Diesel and Gas Engines also Cyclotrons, Chocolate Enrobers and Plastic forming Presses; all types of Shower Baths and Hospital Hydrotherapy; processing X-Ray, Regular and Colored Film — and hundreds of other uses.

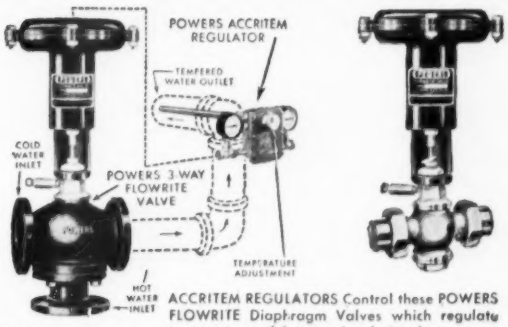
Only one of Powers varied line of water temperature controls is shown here . . . the *Accritem Regulator*. It's compressed air operated, has calibrated dial temperature adjustment, adjustable sensitivity and many other features described in *Condensed Catalog 3035*.

Compressed Air Operated

Only one of many applications Small Size. Bulb is 12" long



Powers Accritem Regulators Give Years Of Dependable Service



(a92)

ACCRITEM REGULATORS Control these POWERS FLOWRITE Diaphragm Valves which regulate temperature of heaters in photo above.

THE POWERS REGULATOR COMPANY
Skokie, Ill. • Offices in Over 50 Cities, see your phone book.
OVER 60 YEARS OF WATER TEMPERATURE CONTROL

For more facts circle 657 on Reply Card

DATA FILE

(Begins on page 193)

DUST CONTROL

338 Dust Control Brochure—Dust and fume control in many industries is the subject of this comprehensive 24-pp booklet. Tells how cloth-tube type dust collectors are handling complex problems in 33 typical installations, all illustrated. Covers use of these collectors in chemical processing, coal cleaning, sewage disposal, many other applications. American Wheelabrator & Equipment Corp.

339 Dust Control Technology—Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

340 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

342 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, d mensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

343 Dust Collectors—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

344 Tubular Dust Filters—Advantages, uses and design of tubular dust filters are given in Bulletin 24-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers. Ruemelin Mfg. Co.

345 Dust and Fume Eliminators—Catalog 482, 12 pp, describes company's Centri-Merge dust and fume eliminators, explaining advantages of the swirl action incorporated. Illustrations include photos of installations, and dimensional drawings of units with capacities ranging from 400 cfm up to 5000 to 30,000 cfm. Schmeig Industries, Inc.

VENTILATING AND AIR CONDITIONING

347 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

348 Vaneaxial Fans—Bulletin J-611 is a 16-pp booklet presenting company's Axivane Series 1000 fans. Explains advantages afforded by adjustable blades for ventilating and other industrial applications. Fans in this line consist of 136 models from 18 to 84 in. dia., volumes to 150,000 cfm. Photos of typical installations included. Joy Mfg. Co.

349 Putting Air to Work—Catalog 600 is an excellent, 60-pp reference text on air and products to put it to work. For plant eng neers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's packed with information on selecting and applying equipment, and there is a section of frequently-used reference data. Sturtevant Div., Westinghouse Electric Corp.

350 Air Conditioning Book, Heating—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

351 Fans and Blowers—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operations, maintenance and lubrication. Hartzell Propeller Fan Co.

353 Roof Ventilators, Louvers—Now available to qualified plant engineers is a collection of literature on gravity and powered proof ventilators and ventilating louvers. Includes a résumé of engineering helps for working out a ventilating problem—a guide for estimating ventilating requirements, installation procedures, sizes and capacities. The Swartwout Co.

FLEXIBLE HOSE

354 Hose and Tubing—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

355 Flexible Hose, Bellows—Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is

34,000 Pounds of Condensate

. . . must be removed every hour day and night from the steam coils in air driers processing salt at Manistee Salt Works, Manistee, Mich.

These Sarco float-thermostatic steam traps have been doing the job since 1948 without a break, at a steam pressure of 150 psi.

They can't air-bind because each trap is equipped with a standard Sarco thermostatic air vent. These vents operate on the balanced pressure principle and are unaffected by changing or fluctuating steam pressures.

Where very large volumes of condensate must be removed instantly, this trap has no equal. For additional information, write for Bulletin 450-10 to *Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.* *Advt. 604*

For more facts circle 658 on Reply Card

• NEW
• INEXPENSIVE
• EASY TO MOVE

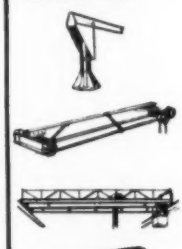
FLEXO-CRANE

For Handling of Loads Up to One Ton

If real economy, safety and ease of operation are of interest to you, check into Abell-Howe's new FLEXO-CRANE. You can buy it complete with hoist and other accessories or assemble it yourself from a FLEXO-CRANE "kit".

Bulletin F-114
Gives You All the Details
Write for It Now

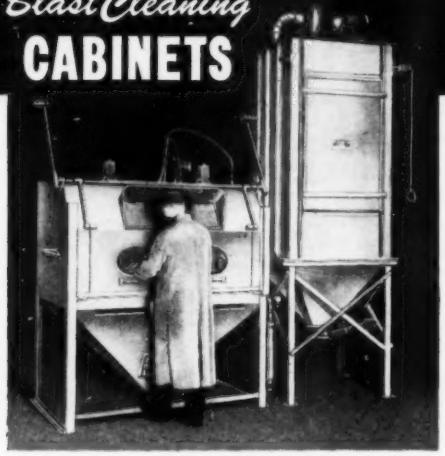
The Abell-Howe line includes a wide range of motorized and hand operated cranes, runways, monorails, electric hoists, storage racks and accessories.



ABELL-HOWE CO. 53 W. JACKSON BLVD CHICAGO 4, ILLINOIS

For more facts circle 659 on Reply Card

RUEMELIN
Blast Cleaning CABINETS



RUEMELIN Blast Cabinets are practical for a great variety of cleaning operations. They are extensively used to remove heat-treating scale and to clean sub-assemblies in metalworking shops, foundries, aircraft factories, etc. Built in many sizes. Furnished complete with dust control equipment. Write for Bulletin 32-B.

RUEMELIN MANUFACTURING CO.
3988 N. PALMER ST. • MILWAUKEE 12, WIS., U. S. A.
Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 5135-1/9AR3

For more facts circle 660 on Reply Card

Don't Spark a Disaster in Your Plant
Use Ampco Safety Tools in hazardous locations

Why take chances with ordinary tools in hazardous locations — chances that can leave your property a smouldering ruin in a few minutes? Why risk the ever-present danger of fire when the right Ampco Safety Tool can prevent expensive property damage—save lives?

Ampco Safety Tools are approved and recommended by Factory Mutual Laboratories and other leading safety authorities for use in hazardous locations. These tools provide low-cost protection wherever there is danger of fire or explosion.

Choose your safety tools from the more than 400 types and sizes that make up the Ampco line. There's one for practically every job in your plant. Order Ampco today! Get the benefit of lower insurance rates and improved worker morale.

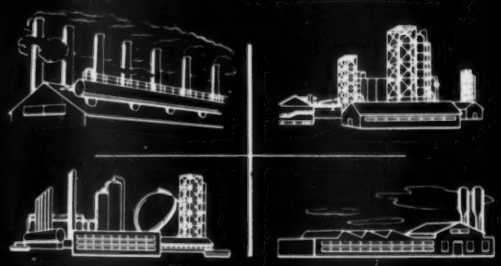
AMPCO **AMPCO METAL, INC.**
DEPT. PS-9
MILWAUKEE 46, WISCONSIN

*Reg. U. S. Pat. Off. by ST. M. International Nickel Co.

WEST OF THE ROCKIES, IT'S AMPCO BURBANK PLANT, BURBANK, CALIFORNIA • IN CANADA — SAFETY SUPPLY CO., TORONTO, ONTARIO

For more facts circle 661 on Reply Card

Use PALMETTO® Supersheat®
the Universal Sheet Packing for General Industry



Palmetto Supersheat #2900 is the industry-wide choice as an all-service flange and joint sheet packing for super-heated and saturated steam at all pressures and temperatures. Recommended also for air, ammonia, gas, acid, alkali and other applications. Look for the Palmetto trademark!

Gives Basic "3-R"* Performance Maintenance Departments Need

* It's *Rugged*—Exceeds Fed. Spec. HH-P-0046. Made of selected long-fibre asbestos pressure-bonded with special heat and chemical resisting bonding materials.

* It's *Resilient* — Compensates for expansion and contraction of flanges. Compressible to meet flange surface irregularities.

* It's *Reliable* — No variance in performance. Homogeneous construction eliminates ply separation. Heat, chemical and pressure resistant.

OUR 90th YEAR — NEARLY A CENTURY OF *Quality*

INVESTIGATE! Write for new Bulletin SP-22 to get details on Palmetto Supersheat—and other fine Sheet Packings and Gaskets for special conditions.

PALMETTO Packings

packing more performance into every application

GREENE, TWEED & CO. North Wales, Pa.

For more facts circle 662 on Reply Card

DATA FILE

(Begins on page 193)

included, regulators and thermostatic devices. Flexonics Corp.

HEATING, COOLING

357 Faster Tank Heating, Cooling—Bulletin IP-250, 8 pp, describes company's Platecoils, embossed metal sheets welded to form compact units through which required heating, or cooling, medium is circulated under pressure. Explains lower costs, faster tank cooling or heating, lighter weight of the units. Kold-Hold Mfg. Co.

358 Heat-on-Wheels for Industry—Illustrated Form 3574, 16 pp, is the story of how manufacturer's portable heaters can solve emergency heating problems. Shows how these heaters provide extra heat for the hard-to-heat spots, and for extra cold areas, to spot heat where needed, and for ventilating, drying, thawing. Herman Nelson Div., American Air Filter Co., Inc.

359 What Unit Heaters Can Do—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation. 8-pp Bulletin 149-A discusses advantages of these heaters and includes performance data. Modine Mfg. Co.

BOILERS, GENERATORS

360 Steam Generators—Data and specifications for completely plant assembled water-tube steam generators are contained in this 8-pp bulletin. They cover nine sizes from 5,300 to 33,000 lb of steam per hour and for pressures up to 400 psi. These units are designed for fully automatic firing with oil, gas, or stoker-fired coal. Superior Combustion Industries, Inc.

361 Oil or Gas Fired Automatic Boilers—Boiler, burner, controls and safety features of 10 to 500 hp oil or gas fired automatic boilers are described in this 4-pp bulletin. Firing rates, dimensions and capacities are given for all models. Boiler Engineering & Supply Co., Inc.

362 How Much for Steam—This is a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

OTHER EQUIPMENT

363 Handbook on Fluid Circuits—Now available to plant engineers is the second printing of "The Circuit Rider." This 32-pp pocket-size manual presents a down-to-earth discussion, together with drawings, of basic designs in fluid power circuits and points out the wide range of operations possible through the application of different types of such circuits. The Logansport Machine Co., Inc.

364 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and converting and general power transmission. Imperial Belting Co.

365 Industrial Exhaust Fan—Housing design, wheel construction and standard arrangements of manufacturer's Type EX exhausters are discussed in illustrated Bulletin C-46EX. Provides capacity tables, dimensions and photos of standard and special fan. Bayley Blower Co.

366 Air Line Cleaner—Eight-pp Catalog 252 describes manufacturer's Aridifier, a mechanical device for removing moisture, scale and other impurities from air or gas lines. Explains, illustrates operation, shows some typical applications and gives average cfm requirements. Tells how to select proper size unit, where and how to install it. Logan Engineering Co.

367 Steam Condensers—Bulletin 102, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc.

368 Slings for Industry—Form 5308 is a compact reference bulletin packed full of sling data. Lists slings of approximate breaking strengths of 1000 lb to 243.4 tons, along with their safe loads for various angles of use. Macwhyte Co.

369 Plumbing, Heating Supplies—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated, gives sizes, intended uses and necessary ordering information. J. A. Sexauer Mfg. Co., Inc.

370 To Keep Out Moisture—Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Manufacturing Co.

371 Weatherized Motors—Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.

372 Hydro-Pneumatic Accumulators—Bulletin 301, 12 pp, explains the function, construction and operation of company's hydro-pneumatic accumulators, giving size and pressure data. Tells how to choose an accumulator with Boyle's law. Use of accumulators as an auxiliary source of power for intermittent duty systems, for leakage compensation, for operating secondary circuits, as an emergency source of power are discussed. Greer Hydraulics, Inc.

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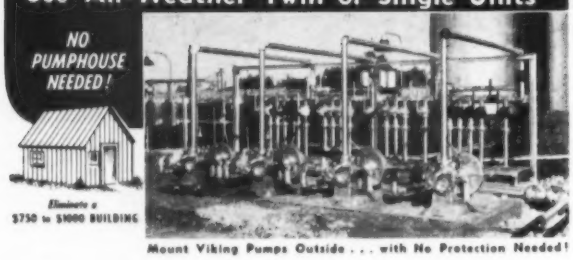

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Operational Analysis

(Continued from page 111)

These movements should be numbered to correspond with the procedure as written for item 2. This condition does not exist in Fig. 1 or 2.

8. Determine the Hazards to Which the Operator is Exposed

This can be done accurately only after a careful study of the drawing and procedure has been made in conjunction with the foreman on the job.

9. Indicate on the Drawing the Location of Each Hazard

Brief notes should be used to describe each hazard, and an arrow used to indicate the location of the hazard in the working area

10. Indicate the Type of Injury Likely to be Sustained

Add to each exposure note, a comment describing the type of injury likely to be sustained by the employee performing the operation.

As an example of this, in Study 1, one of the hazards was "lack of clearance, and obstruction cause operator to bump into and trip over objects." The type of injury likely to be sustained by the employee for this hazard was "abrasion and contusions."

Do not include recommendations or suggested corrective measures on the study as it is designed to reflect conditions as they exist at the time the study is made, and as such, should be maintained in a permanent file, until a revision of the study is made.

Upon completion of the aforementioned steps, the completed study should include a detailed procedure and a layout drawing describing a particular operation, listing the hazards, and the type of injury to be expected. A study of

(Continued on page 220)

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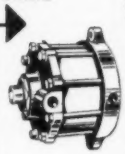

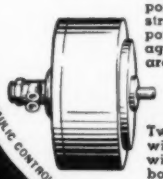

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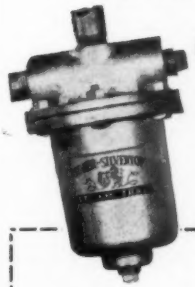

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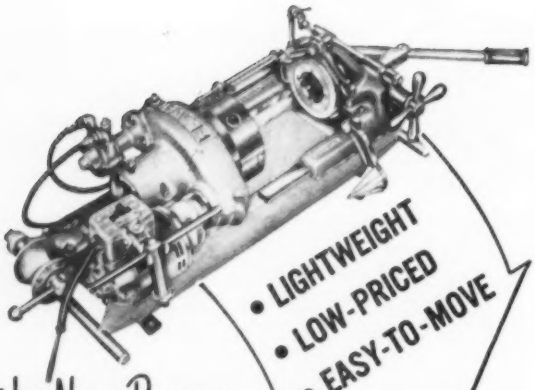

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(Continued from page 218)

this sort will reveal numerous hazards, some serious, others trivial. Many of the hazards listed will not, within practicability, be able to be corrected. What results, is a detailed analysis of a particular operation, completely describing it from the point of view of safety.

Figures 1, 2, 3 and 4 are examples of studies of this sort which have been completed. When presented to management, each study was supplemented by a letter describing suggested corrective measures.

In addition to inclusion in management reports, these studies have been used as a basis for new employee orientation programs; job training; safety meeting discussions; bulletin board material and job descriptions. New employees

can be made aware of the hazards to which they are exposed as well as the precautions to be taken. By keeping these visual reminders in front of the foreman and his crew, they are made conscious of the hazards to which they are exposed and in this way the likelihood of an accident occurring will be minimized.

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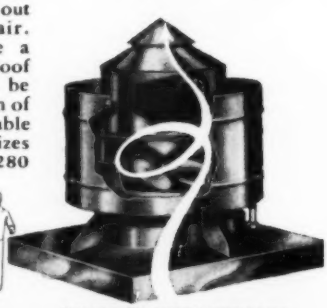

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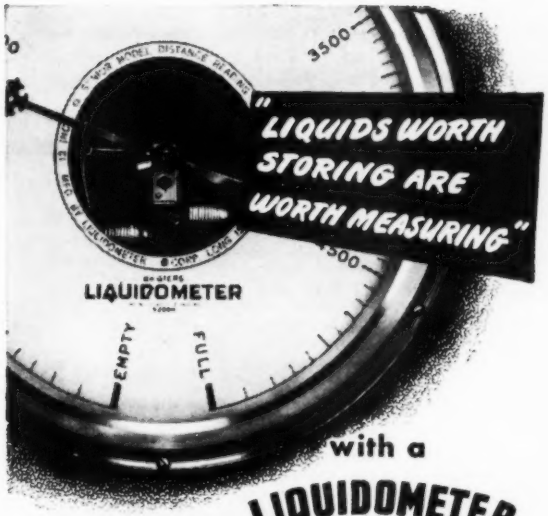

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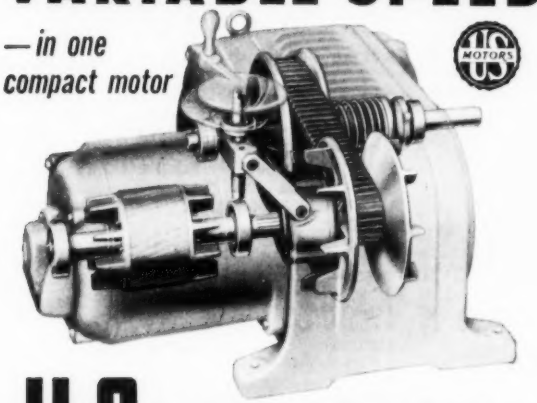

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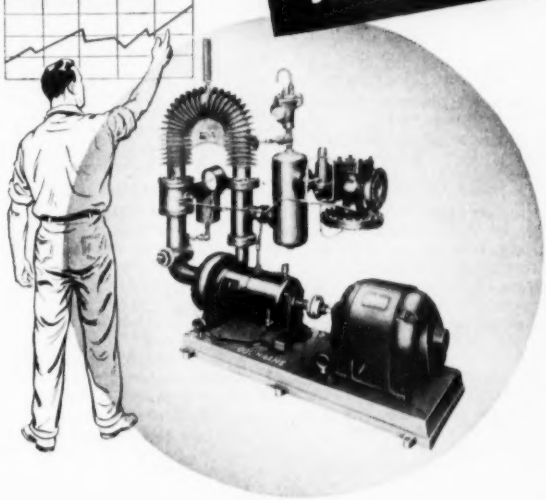

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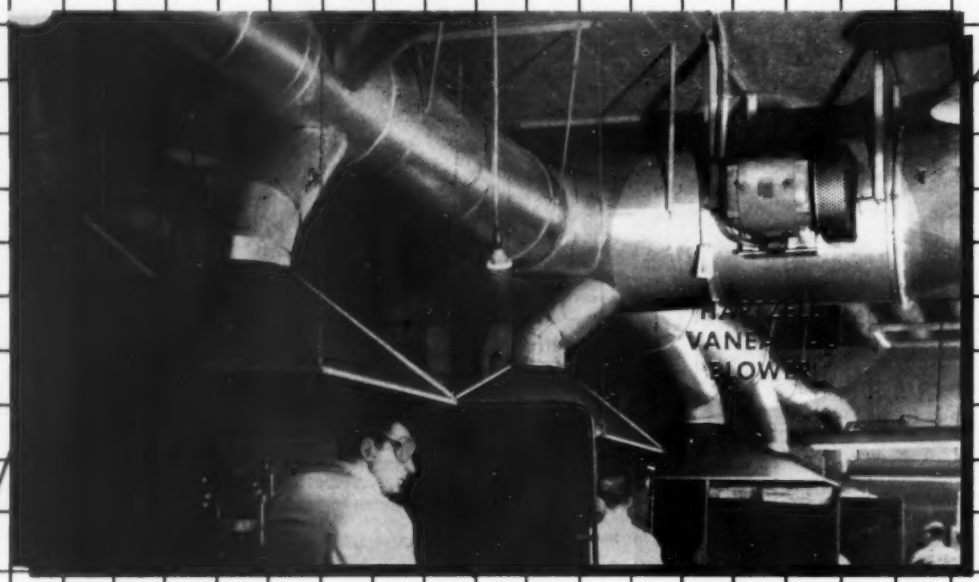

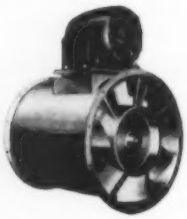

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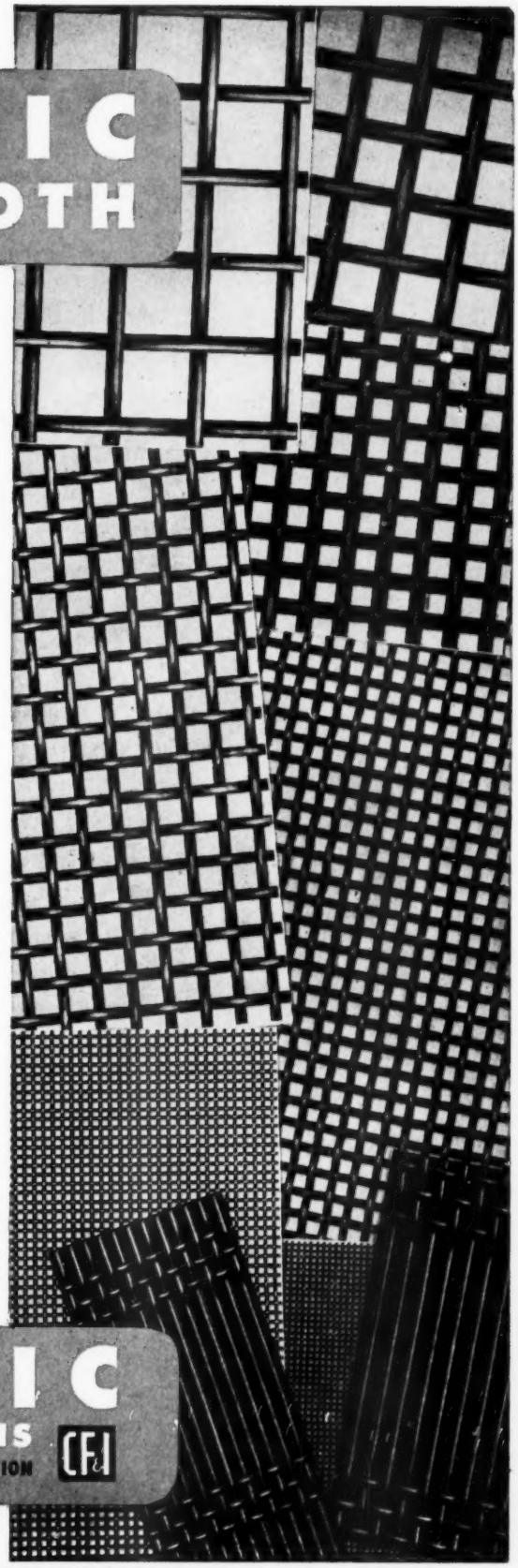

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Look for These 7 Signs of GOOD PUMP DESIGN

CAST SHAFT SLEEVES, not commercial tubing, save the shaft from wear. Sleeves extend through the stuffing box and seal at the impeller hub.

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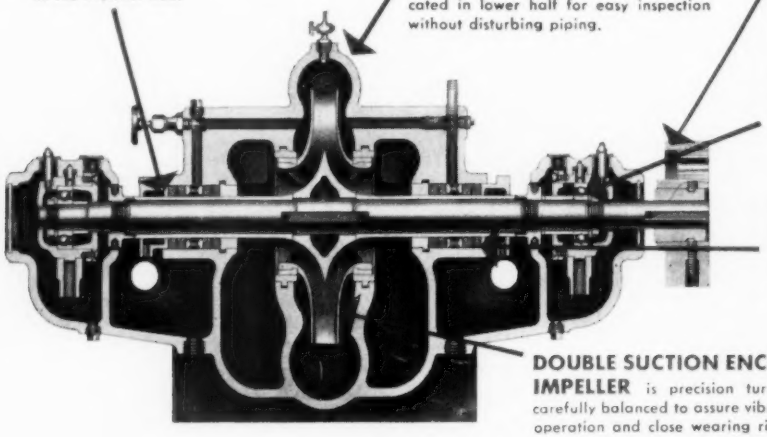
COUPLINGS have *Magic-Grip* quick change bushings for pump and drive shaft. Pin and rubber bushing type usually used. Removal for maintenance is easy.



BALL BEARINGS may be furnished for either oil or grease lubrication. Sleeve bearings also available in larger sizes.

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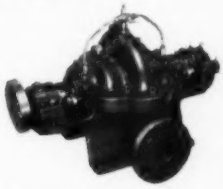

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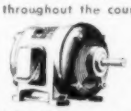

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The magazine that helps plant engineers with their everyday problems